Part II – Coastal Development Issues

Coastal Armoring
Desalination
Harbors and Dredge Disposal
Submerged Cables

Coastal Armoring Action Plan

Goal Statement
The goal of this workgroup is to devise a framework to minimize impacts to Sanctuary resources from coastal armoring, while recognizing the issue of protecting public and private property.

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Introduction
About 85% of the California coast experiences active erosion due to natural, and anthropogenic causes. Storm damage continually erodes away at the coastline, most notably during El Niño years such as the 1982-83 episode, and other heavy storms. This ongoing erosion, which is largely a natural occurrence, presents a threat to coastal development that has occurred in areas vulnerable to these processes. Hard surfaces, such as concrete, cover large portions of land, impede the natural absorption of water, and thus exacerbate surficial erosion on adjacent unprotected land. Furthermore, in some areas, natural sand transport to the coast has been decreased through the damming of streams and rivers. Increases in coastal development also have led to storm-related damage. A 1992 study by Griggs, Pepper and Jordan estimated that the cost of storm related damage and erosion, as well as structures used to mitigate the destruction throughout the state of California, averaged $100 million annually.

Shoreline protective structures have been used extensively along California's 1,200 mile coastline to protect infrastructure and other development from wave action, or to retain soil to avoid erosion. Shoreline protective structures have typically been installed by private landowners, local, state, or federal governments, in an attempt to protect development threatened by erosion. Structures have also been installed in response to the need to protect public infrastructure such as Highway 1, which in some stretches, is vulnerable to erosion related to bluff retreat. This practice is commonly known as coastal armoring, and seawalls, bulkheads and revetments are some of the structures used for coastal armoring. Seawalls are barriers, usually vertical walls, between the land and water that protect from wave erosion. A bulkhead is used as a retainer, providing protection and stabilizing the land that it supports. Revetments are

protective structures placed along slopes and are constructed of a sturdy material such as stone. With increases in development and continued, natural erosion of coastal bluffs, additional pressures will come to install structures both to access the coast and to protect private and public property from erosion.

The Army Corps of Engineers conducted an assessment of coastal armoring in 1971, and found that 3 miles of the coastline between the Santa Cruz/San Mateo County border (all in the City of Santa Cruz), and Point Lobos in Monterey County was armored. By 1978 armoring had increased to 9.6 miles, and by 1993, armoring had increased to 12 miles. A 1995 report of the California Coastal Commission (Commission) estimated that if trends continue, there would be as much as 27.7 miles of coastal armoring in the same area, in the future. The report stated that although only one-eighth of the study area was armored in 1995, one-third of the coastline has the potential to warrant future protection when considering land use patterns, and physical characteristics.

The trends in Santa Cruz and Monterey Counties are typical of the state. By 1998, coastal armoring had been installed to protect about twelve percent (or almost one-eighth) of the coastline statewide. The mid and late 1980's was a period when a large amount of shoreline armoring was installed – in response to the 1982/83 El Niño and the major storms that occurred in 1986 and 1988. Between 1985 and 1990, forty-five miles of armoring was installed, costing an average of $1,500 per foot ($60 million/year). By 1998, California residents were paying more than $75 million per year to armor the shoreline. In a study conducted by Griggs et al., in 1992, it was determined that ocean front development has occurred in California, in the face of a large amount of scientific and empirical evidence regarding the risks of erosion. Griggs et al. concluded also that there was a large degree of inconsistency among existing state and local policies in addressing coastal hazards, and that there was a significant economic and local political influence shaping these policies.

Development occurred in vulnerable areas along California's coast, followed by a desire to protect both private and public property and infrastructure. The situation presents a serious predicament to both resource managers and property owners. However, it is clear that current policies need strengthening, and there is a need to develop collaborative approaches to address the issues of erosion and the demand for coastal armoring, including improved guidance to enable better decision-making.

Impacts of Coastal Armoring

Environmental impacts of coastal armoring are both site specific and cumulative. The effects vary significantly depending on the type of structure constructed, the magnitude of the project, and the specific geological, biological, and oceanographic conditions in the vicinity of the structure. Thus the impacts of an individual project need to be evaluated on a case-by-case basis. Coastal armoring can potentially damage or alter local coastal habitats, deprive beaches of sand, lead to accelerated erosion of adjacent beaches, hinder access and present problems with public safety.

As with any activity that alters natural processes, there can be significant long-term impacts related to coastal armoring. Currents, waves, and wind normally transport sediment throughout

the littoral system. Armoring of the coast can interfere with littoral transport, which in a natural state may reach a dynamic equilibrium. When the availability of sediment is reduced due to the existence of a structure, erosion can increase in other nearby locations. This is due to starvation of the materials that would normally supply these areas. When a structure is constructed, a supply of sediment is effectively being cut off. Armoring also causes deflection of wave energy, which can accelerate erosion of nearby sites, and thus expand the need for shoreline armoring structures. In some cases, installing coastal armoring begets more coastal armoring. Furthermore, armoring can result in the loss of beach and intertidal areas through a process that has been termed "passive erosion." Areas undergoing long-term net erosion experience a natural landward movement of the entire beach system during periods of sea level rise, such as has been the case for approximately the last 18,000 years. As cliffs and sand dunes retreat, the vacated area becomes part of the beach environment and the position of the beach shifts landward. Building a protective structure in front of a cliff or dune temporarily stabilizes the seaward location of the cliff or dune edge, however beach erosion continues. Since no new beach area is created through cliff or dune retreat, a net loss of beach area occurs. Ultimately, as erosion continues, this process also will result in the loss of the intertidal zone, as waves impact the seawall at all times, low tide as well as high.

Vertical structures in particular can deflect wave energy causing increased erosion and altering natural habitat in front of the structure. Reflected wave energy may make it difficult for organisms to inhabit the area because of high turbidity. Erosion caused by the reflection of wave energy is more severe with vertical structures than with curved, stepped, or inclined structures, which absorb or disperse the energy of the waves [3]. The significance of this reflected wave energy will vary, depending upon how frequently the wall is inundated or impacted by waves, and how much the reflective characteristics of the wall differ from the natural shoreline. A wall that is only subject to wave attack once a decade would only alter the reflected wave energy once a decade. Also, a vertical bluff and a vertical wall would have fairly similar reflective characteristics, while a dune and a vertical wall would be very different.

Potential biological impacts of coastal armoring include changes in abundance and distribution of species. Coastal armoring structures can influence the structure of benthic communities, due to potential differences in settlement patterns for natural substrates and armoring structures. Armoring structures can encroach into the intertidal, or disturb important buffer areas such as marsh habitat between the marine and terrestrial environments, which naturally mitigate erosion, and play an important role in flushing of certain contaminants [3]. Certain structures can also provide habitat for predatory species not normally associated with the beach and intertidal zone such as rats and squirrels, which can feed on intertidal organisms, compete for food with native species, and transmit disease.

Seawalls can have recreational impacts as well, by blocking both vertical and lateral access to beaches, and altering wave patterns, which can negatively impact surfing conditions. Additionally, coastal armoring can act as a barrier to wildlife, by blocking access of certain species to the beach.

Environmental impacts that occur during the construction phase of coastal armoring projects are generally short term, lasting only a few days to a few weeks. Problems include increased

turbidity caused by suspended solids in the immediate vicinity of the construction site, and the risk of chemicals or other materials entering the ocean from construction activities. Structures constructed in the intertidal zone have more impact than those constructed above the high tide line. Certain types of structures such as riprap revetments have fewer initial impacts than other hard structures, since construction normally requires significantly less excavation than, for example, a seawall. Permanent impacts of revetments however, are similar to those of seawalls, and the footprint of the revetment is typically larger. Many short-term construction impacts can be minimized through appropriate mitigation. Mitigation measures include scheduling of the construction phase to reduce impacts by considering animal migration patterns, spawning patterns, etc, and specific actions such as the use of silt curtains.

Existing MBNMS Regulations

Sanctuary regulations prohibit alteration of the seabed, and all armoring structures placed below the mean high tide line require approval from the MBNMS. The Sanctuary regulates coastal armoring by authorizing Commission permits, and issuing specific conditions on those permits. Many seawalls have been constructed with no notification to or authorization from MBNMS. Since 1992, MBNMS review of seawalls primarily focused on minimizing impacts from the construction process rather than long-term impacts from the armoring itself. A major focus of this Action Plan is to conduct long-term planning as to the consequences of coastal armoring and its affect on some of the Sanctuary's most treasured resources, its beaches, bluffs, and coastline.

Since its designation, MBNMS has reviewed and authorized Commission permits for seawalls, riprap or other coastal armoring projects at 15 sites. Only a portion of the total coastal armoring projects underway in the region came to the Sanctuary for review, clearly indicating a need for improved inter-agency coordination. Of the permits reviewed by MBNMS, six were issued for extension and/or repair of existing seawalls, four for new seawall or revetment construction, two for road stabilization projects to prevent bluff erosion, two for replacement of rip-rap with seawall, and one for stabilizing and adding to existing rip-rap. Eleven of these 15 permits were in Santa Cruz County, 3 were in San Luis Obispo County, and 1 was in Monterey County.

A NOAA response to a comment urging the Sanctuary to prohibit the construction of seawalls, in the MBNMS Final Environmental Impact Statement states: "Activities that require drilling into, dredging, or otherwise altering the seabed of the Sanctuary, or constructing, placing, or abandoning any structure, material, or other matter on the seabed of the Sanctuary are prohibited except as allowed under 15 CFR § 944.11 or exempted under activities related to the maintenance of harbors. Seawall construction would not be allowed [6]." This statement clearly indicates the intent to prohibit seawall construction that is inconsistent with current and past practices. Nonetheless, the regulations adopted for the Sanctuary allow Sanctuary management to allow development, otherwise prohibited, by "authorizing" other agencies' permits, such as the Coastal Commission. There are three activities that MBNMS regulations expressly do not allow a sanctuary manager to permit—oil and gas development, designating new dredge disposal sites, and new sewage outfalls. The express regulatory prohibitions for which permits cannot be issued do not include seawalls. Thus MBNMS staff has interpreted this response to comment in the context of the regulatory framework set up in 1992.

Development along the coast increases the pressure to protect coastal structures with various types of coastal armoring such as seawalls, bulkheads and revetments to manage erosion. Approximately 14 miles of the approximately 290 miles of coastline is already armored in the MBNMS, and this amount is estimated to double if trends continue. In light of this situation, MBNMS staff recently initiated a joint evaluation of coastal armoring with the Commission, (1) to develop a more proactive, comprehensive regional approach, (2) to improve the current case by case permit system and (3) to strengthen coordination between the Commission and the MBNMS on coastal armoring permit review.

Strategy Implementation

The Sanctuary will work with its partners in implementing the following strategies and activities. While MBNMS will carry out some of the items independently, many strategies represent collaborative efforts that will be implemented in partnership with the various agencies and organizations involved in coastal armoring and coastal resource protection.

Strategy CA-1: Issue Characterization and Needs Assessment

Strategy Description:
Staff will characterize the issue and determine information needs. Identify existing information and data gaps, and compile and produce scientific data and evaluation tools:

Activity 1.1: Produce Sanctuary-wide Maps and Database for use as Planning and Permit Review Tools

A. Map existing coastal armoring sites and potential future site requests
B. Develop regional integrated database and GIS layers showing land use types, parcels, coastal armoring locations, beach and bluff erosion rates, bottom types, biological habitats, geology/geomorphology, etc.

Activity 1.2: Compile and Analyze Data

A. Assess individual and cumulative impacts of coastal armoring on sand supply dynamics, marine biological habitats and ecosystems, and public access
B. Compile information on or conduct studies to estimate coastal bluff erosion rates, and shoreline change rates (Commission with NOAA Coastal Fellow)
C. Compile or conduct regional evaluation of sand transport dynamics and beach nourishment

Activity 1.3: Incorporate Data and link with State Programs
Incorporate information from the above studies into maps and database from Activity 1.1, and link to State of California's COASTAL SEDIMENT MANAGEMENT MASTER PLAN.

Activity 1.4: Develop and Implement a Long-term Monitoring Program
Quantify and compare the impacts of different types of coastal armoring structures, in various habitat types and conditions. Considerations for monitoring program include intertidal biological community structure, changes in beaches, wave refraction patterns, and impacts on sand budget.

Strategy CA - 2: Develop and Implement Regional Approach

Strategy Description
The goal of this strategy is to develop and implement a more proactive and comprehensive regional approach that minimizes the negative impacts of coastal armoring. This approach will consider short-term impacts throughout the life of the structure, including those related to construction and maintenance, as well as long-term cumulative impacts.

Activity 2.1: Develop Hierarchy of Preferred Responses to Erosion

A. *Use of preventative measures*: Identify and evaluate preventative measures aimed at reducing the need for coastal armoring. Considerations may include increased setback requirements, incorporation of a "no hard armoring" policy (possibly in covenants, codes, and restrictions) for new subdivisions or situations when coastal agricultural land is converted to development, re-alignment of coastal roads and highways, and new setback requirements to be established for demolition/rebuild projects in urbanized areas
B. *Alternatives to coastal armoring*: Identify and evaluate alternatives to coastal armoring, including but not limited to: a) alternatives conforming to MBNMS regulations such as relocation of vulnerable structures, re-alignment of coastal infrastructure such as roads, bridges, and highways, and control of surficial erosion, and; b) alternatives not conforming to sanctuary regulations, including some sand supply strategies and artificial reef structures
C. *Preferred types of coastal armoring:* In cases where armoring is deemed necessary, identify and evaluate the least environmentally damaging types of coastal armoring, including more natural alternatives for specific conditions and geographic locations, taking into account engineering, environmental, aesthetic and public access concerns

Activity 2.2: Develop Guidelines for a Sub-regional Planning Approach
Potential criteria could be: pristine or particularly sensitive areas where coastal armoring should be strongly discouraged or not allowed; urban zones which are already heavily armored and where efforts should focus on restoration and improved armoring techniques; and areas in-between where thorough case-by-case review and additional research is needed. Criteria to consider in developing guidelines include:

A. Biological sensitivity of habitats
B. Physical considerations including: geological units; sediment sources and sinks; beach nourishment needs; shoreline orientation; and erosion rates
C. Development pressures including: extent of existing armoring; potential for new armoring requests; types of structures to be protected and; level of development and infrastructure

Activity 2.3: Identify Planning Sub-regions and Planning Guidelines
Logical sub-regions might be only a mile or two in some urban areas such as Santa Cruz, but could range up to many miles for long stretches of rural coastline such as Big Sur. MBNMS Staff will work to identify boundaries for sub-regions and consider measures from the hierarchy in Strategy 2; Activity 2.1, in determining priority planning approaches for each sub-region.

Activity 2.4: Develop Maintenance and Restoration Program
MBNMS staff will develop a program for maintenance and restoration of existing armoring, including "clean-up" of poorly maintained sites, for both authorized and illegal structures.

A. *Re-evaluation of Need*: When maintenance is requested, re-evaluate the need for protection. If protection is required, ensure that the proposed method is the least environmental damaging, and that appropriate mitigation of environmental impact is implemented
B. *Public Improvements:* Incorporate improvements in beach access and public safety into maintenance and restoration program
C. *Evaluation of Potential for Comprehensive Structure:* In heavily armored areas where maintenance is necessary and appropriate, consider the potential for installation of a comprehensive, uniform structure to replace multiple individual structures

Activity 2.5: Reduce Need for Emergency Permits
MBNMS staff will develop a plan to reduce the use of and need for emergency permits through better predictive erosion analyses, potential alteration of current guidelines regarding initiation of work, and more proactive regional planning. Staff will consider areas where it is appropriate to either initiate the work or develop alternative solutions, before the site becomes an emergency.

Activity 2.6: Develop a Multi-Agency Enforcement Program
MBNMS will develop a multi-agency enforcement program to include inspection of permitted coastal armoring structures, tracking/notification and corrective action regarding illegal structures, and removal of emergency structures that are not permitted but remain in place.

Activity 2.7: Consider Sand Supply Program
If warranted, based on above scientific evaluation (*Activity 1.2, A)* and needs assessment, consider an environmentally sound sand supply program for beaches, and develop and implement monitoring protocols for the program. Evaluate as potentially avoiding armoring or mitigating armoring. If deemed appropriate, such a program involving beach nourishment within MBNMS boundaries may require future revision of Sanctuary regulations; or could occur via permit or authorization.

Activity 2.8: Compile, Track and Distribute Updated Information
MBNMS Staff will develop a system for tracking and distributing new information and scientific findings, as well as a system for updating and revising guidelines with this new information.

Activity 2.9: Identify Funding and Partnership Opportunities
MBNMS will identify and investigate funding and partnership opportunities to implement this action plan, and take a more proactive approach in addressing coastal erosion.

Strategy CA-3: Permit Program Improvements

Strategy Description
The goal of this strategy is to improve the current case-by-case permit system and strengthen coordination between the MBNMS and other agencies on coastal armoring permits.

Activity 3.1: Integrate State and Federal Planning Programs
Where possible, MBNMS will link and integrate aspects of MBNMS coastal armoring plan with California state erosion policy and Coastal Sediment Management Master Plan.

Activity 3.2: Incorporate MBNMS Standards into Agency Permits
MBNMS staff will work with the California Coastal Commission to incorporate current MBNMS standard conditions regarding construction process into Coastal Commission permits.

Activity 3.3: Develop Consistent Permitting Conditions
Following the initiation of regional analysis from Strategy 2, MBNMS staff will identify permit conditions and authorization criteria of the agencies involved in the regulation of coastal armoring. Staff will subsequently compare typical multi-agency seawall permit conditions, identify and discuss selected discrepancies, and where possible rectify discrepancies.

Activity 3.4: Clarify Level of MBNMS Involvement in Projects and Develop Review Thresholds
Staff will develop and identify a threshold for full MBNMS review of selected projects based on overall footprint, location, and potential impacts, and ensure early communication on these projects. Staff will also develop and identify a threshold below which MBNMS does not individually review project, but relies on Coastal Commission permit review process to incorporate standard MBNMS conditions.

Activity 3.5: Share Information with Other Agencies
MBNMS staff will work with other agencies to improve early sharing of information on projects and permits among all relevant agencies.

Strategy CA-4: Program Implementation and Training

Strategy Description
The goal of this strategy is to provide outreach and training to local, state and federal agencies about the regional coastal armoring program

Activity 4.1: Conduct Needs Assessment
Staff will conduct a needs assessment to determine best strategies for reaching target groups including: decision makers, agencies, coastal landowners, and coastal developers (investigate potential for collaboration with the National Estuarine Research Reserves Coastal Training Program workshops in conducting outreach and training programs).

Activity 4.2: Conduct Outreach to Agencies and Property Owners
MBNMS Staff will provide ongoing guidance to local, state, and Federal agencies, developers, and private property owners, about regional approaches to coastal armoring and promote guidelines.

Activity 4.3: Review and Comment on Local Land Use Decisions
MBNMS Staff will track and evaluate local and regional land use decisions where coastal development may negatively impact MBNMS resources.

Activity 4.4: Review and Comment on Local Coastal Program Updates
MBNMS staff will work with Local Coastal Program updates to improve existing policies, and incorporate these guidelines where possible.

Citations

1 California Resources Agency. Draft Policy on Coastal Erosion Planning and Response and Background Material. March, 2001.

2 Griggs, Gary B., James E. Pepper and Martha E. Jordan. California's Coastal Hazards: A Critical Assessment of Existing Land-use Policies and Practices, California Policy Seminar, University of California. 1992.

3 U.S. Army Corps of Engineers. Engineer Manual. Design of Coastal Revetments Seawalls, and Bulkheads. 1995.

4 California Coastal Commission. ReCAP Pilot Project Findings and Recommendations: Monterey Bay Region. September, 1995.

5 Griggs, Gary. California Needs a Coastal Hazards Policy. Coast and Ocean Magazine. Volume 13, No. 3, 1998. http://www.coastalconservancy.ca.gov/coast&ocean/autumn98/a04.htm

6 Monterey Bay National Marine Sanctuary Final Environmental Impact Statement/Management Plan. Appendix F, Page 36. June, 1992.

Desalination Action Plan

Goal Statement
The goal of this action plan is to minimize the impacts to marine resources, in the MBNMS, from desalination activities.

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Introduction
Desalination is the process by which salts and other chemicals are removed from salt or brackish water and other impaired water resources. It is also known as desalinization or desalting or commonly referred to as "desal." As traditional sources of fresh water continue to be depleted and degraded, society is increasingly looking toward desalination as an option for obtaining water for both private, and municipal freshwater supply. In the past it has not been used extensively in this country, primarily because the cost of the product water has been so much higher than that from conventional sources. With more efficient desalting technologies being able to produce the water cheaper, in conjunction with escalating costs of obtaining fresh water from conventional sources, desalination is likely to look more and more attractive as an option to many proponents.

While desalination refers to any technology that removes salt from water, it includes a wide range of technologies that fall into two main categories, with many variations on each. Distillation processes involve heating the intake water to produce steam, which is then condensed to produce water with a very low salt concentration. Reverse Osmosis (RO) refers to the processes in which intake water is pressurized and forced through a semi-permeable membrane. The water passes through the membrane, but the salt molecules do not. With either technology, after the desalting process both fresh water and concentrated saline brine are produced. RO is the predominant technology being used and proposed in the Sanctuary region.

Three desalination facilities currently operate within the boundaries of the Sanctuary; however there has recently been an increase in interest for both private and public desalination plants. Approximately ten facilities have recently been proposed. Rather than utilizing a coordinated regional planning approach, each plant has been conceived and designed as a separate project. Due to population growth in the area, continuing shortages and degradation of conventional water supplies, and advances in desalination technology, the trend will likely continue. Desalination plants have the potential to negatively impact the marine environment through the introduction of brine waste effluent and other substances to Sanctuary waters. Additionally, the construction of desalination facilities and associated pipelines often causes alteration of the seabed.

This action plan lays out a framework for a regional approach to address desalination, aimed at reducing impacts to marine resources in the Sanctuary through consideration of regional planning, facility siting issues, on-site mitigation measures, modeling and monitoring, and outreach and information exchange. While the Sanctuary is concerned with potential growth inducing impacts associated with increased supplies of water from desalination facilities, decisions regarding water supply and use will ultimately fall to local governments (cities and counties), the California Coastal Commission, and water agencies, to address and resolve. It is also the responsibility of these agencies to ensure that all alternatives have been analyzed, and that desalination is a necessary option.

Potential Impacts of Desalination

Desalination impacts vary widely and typically vary based on the specifics of each site. The degree of the impacts in large part depends on overall plant design and operation, methods used for effluent disposal and specific physical and biological conditions in the vicinity of the plant. While desalination can cause adverse environmental effects, there are often effective mitigation measures that can be taken to reduce impacts. Furthermore, it is important to consider that all other methods of obtaining municipal fresh water also involve major environmental impacts. This is especially the case when salt-water intrusion, or damage to anadramous or endangered species habitat caused by over-drafting of water from aquifers, rivers, and streams, are an issue.

Construction of a desalination facility, especially if new offshore pipeline construction is involved, can have significant environmental impacts, including disturbances to seafloor, surf zone, and dune ecology. By using existing pipeline structures or alternative technologies such as injection wells or percolation galleries, benthic impacts can be minimized or eliminated altogether.

The Sanctuary is also concerned with the discharge of the hyper-saline water that remains as a byproduct from the desalination process. This brine effluent is generally about twice as salty as the ambient seawater, however this varies depending upon the specific technology being used, and can range anywhere between 46 and 80 parts per thousand (ppt) (typical salinity in the region of the MBNMS is around 33ppt). This effluent is denser than seawater and without sufficient mixing, tends to sink to bottom where it may become concentrated. Both high levels of concentration, and fluctuations in salinity levels may impact sensitive organisms near the outfall. While tolerances vary among organisms, more research is needed to determine the extent of impacts for various species found in the MBNMS. The impacts of the brine effluent vary widely

as a function of the location of the outfall. Impacts are generally more severe in rocky substrate than sandy seafloor habitats. Other issues associated with the discharge are: increased turbidity; and concentration of organic substances and metals that are contained in the feed waters. Additional impacts specific to distillation facilities include concentration of metals picked up through contact with the plant components, thermal pollution and decreased oxygen levels.

While if unmitigated, the impacts caused by brine effluent can be severe, there are many existing measures that can be taken to minimize these impacts. Certain technologies such as injection wells or percolation galleries minimize the impact from the saline brine discharge due to adequate mixing of brine and ambient seawater. Diffusers of appropriate design and number, used with open ocean disposal structures also can facilitate mixing of desalination discharge with ambient seawater in a limited mixing zone. Certain plants, such as the one located in the City of Marina, and the proposed Sand City facility utilize brackish groundwater as a feed water source; this results in a reject that is lower in salinity than typical brine effluent from similar facilities that desalt seawater.

Intake of water directly from the ocean usually results in loss of marine species as a result of impingement and entrainment. Impingement is when organisms collide with screens at the intake, and entrainment is when species are taken into the plant with the feed water and are killed during plant processes. Impingement and entrainment impacts can be mitigated by the use of certain designs and technologies. Properly engineered intake structures can reduce the potential for entrainment and impingement, and in certain cases the need for chemicals. Structures such as onshore intake wells or infiltration galleries have been proven highly effective. Appropriately sized screens at the intake, as well as low velocity water flow are potential mitigation measures for open water intake structures.

Clearly the most contentious and controversial issue surrounding desalination is its potential to induce community growth. Along most of California's central coast, fresh water supply is the limiting factor for community growth. With the addition of an unlimited source of freshwater, growth can be allowed to occur. While this issue is not addressed directly by Sanctuary regulations, it is of major concern. Increased development of the coastline adjacent to the MBNMS could lead to degradation of water quality and many other challenges to the protection of Sanctuary resources. It is up to local jurisdictions to ensure that a proliferation of desalination facilities does not lead to unsustainable community growth, through responsible planning, and limitations in plant capacities. This issue is addressed by many other agencies including the California Coastal Commission and local jurisdictions.

Desalination in the Sanctuary

Sanctuary management is concerned with desalination, because it has the potential to negatively impact the marine environment through the introduction of brine waste effluent and other substances to Sanctuary waters. Additionally, the construction of desalination facilities and associated pipelines often causes alteration of the seabed. Three of the Sanctuary's regulations relate directly to desalination. The first involves a prohibition on discharging or depositing any material within Sanctuary boundaries. Since the brine effluent, and in some cases other materials, are usually disposed of in ocean waters, this activity requires Sanctuary authorization of Regional Water Quality Control Board (RWQCB) permits. The second Sanctuary regulation

pertains to discharging materials outside of the boundaries, which subsequently enter Sanctuary waters and negatively impact MBNMS resources. As with the previous regulation, Sanctuary approval via authorization of the RWQCB permit is required. The third relevant regulation involves a prohibition on activities that cause alteration of the seabed. Thus installation of certain desalination facility structures such as an intake/outfall pipeline on or beneath the ocean floor will also require Sanctuary authorization.

Three small desalination plants currently operate in the Sanctuary:

> *Duke Power Plant* in Moss Landing contains a seawater distillation plant that produces a little less than 0.5 million gallons per day (MGD) for use in its boiler tubes for the power production process. This facility uses power plant cooling water as the source for the desalination feed water and brine effluent discharge. Due to the large volume of cooling water being discharged by the plant, the brine effluent is diluted and impacts from the salinity are eliminated.
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> *Marina Coast Water District* in the City of Marina operate a small plant with the capacity of 0.45 MGD, currently supplies about 13% of the city's annual municipal water consumption. This plant uses a beach well for intake water, and an injection well for discharging brine effluent. This facility was originally built in 1996, and will be renovated in the near future, with new technologies that will greatly increase its efficiency.
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> *The Monterey Bay Aquarium* operates a very small facility that provides about 0.040 MGD for maintenance purposes such as flushing the toilets. The saline brine discharge is blended with, and effectively diluted by the exhibit water outfall.

Although there are currently only three facilities in operation, there has recently been an increase in proposals for both private and public desalination plants. There are approximately ten additional facilities in the Sanctuary region that are in some stage of initial consideration or planning. These range from small, less than 50,000 GPD private facilities such as the proposed RO plant for the Ocean View Plaza to be built on Cannery Row in Monterey, to larger multi-city regional projects like the ones the City of Santa Cruz and Monterey Peninsula Water Management District are currently investigating. There are also several proposals for small to medium size projects to serve a single city, such as the proposed plants in Cambria or Sand City. Due to population growth in the area, continuing shortages and degradation of conventional water supplies, and advances in desalination technology, the trend will likely continue.

Strategy DESAL-1: Regional Desalination Program

Strategy Description
The goal of this strategy is to develop and implement a regional planning program to address desalination facility development and operation in the MBNMS. There is a need for a comprehensive regional approach to address the issue of desalination, to minimize the impacts to resources. This will provide increased coordination and planning among desalination proponents and relevant agencies that are now dealing with an array of independent desalination proposals.

Activity 1.1: Develop Regional Planning Program
The MBNMS staff will develop and implement a regional planning approach to desalination that considers siting, volume of water requested, service areas, and potential collaborations. The following systems and standards shall be incorporated into the program:

A. Develop and implement a system for near-term coordination of existing proposals, as an interim measure, prior to the development and implementation of the strategies and activities in this action plan
B. Develop and implement a system for improved coordination among agencies involved in permitting desalination, and among interested parties, in implementing the following strategies and activities in this action plan
C. Ensure opportunity for input from local jurisdictions
D. Consider establishment of a Joint Review Panel to coordinate environmental review and decision making on larger projects, which require Federal, state, and local approvals as well as CEQA and NEPA review
E. Investigate potential for use of full capacity of existing desalination facilities before approval of construction of new plants
F. Develop and implement a system to improve tracking of new desalination proposals in order for the Sanctuary and other agencies to enter into discussion with desalination plant proponents and interested parties early on in the process
G. Evaluate regional opportunities for joint facilities serving multiple jurisdictions, collocation of facilities at existing discharge sites, etc.

Status: Phase 1
Potential Partners: California Coastal Commission (CCC), Central Coast Regional Water Quality Control Board (CCRWQCB), State Water Resources Control Board (SWRCB), local jurisdictions

Activity 1.2: Encourage Development of a Multi-Agency Regional Desalination Plan
MBNMS staff will encourage development of a regional plan by the California Coastal Commission and local jurisdictions to address and mitigate significant growth-inducing impacts. MBNMS shall participate by sharing information and concerns on potential impacts of growth to Sanctuary resources.

Status: Phase 1
Potential Partners: CCC, CCRWQCB, SWRCB, San Mateo, Santa Cruz, Monterey, San Luis Obispo Counties, AMBAG, land use and environmental organizations (e.g., Land Watch)

Strategy DESAL -2: Facility Siting Guidelines

Strategy Description
Environmental impacts in large part depend on specific physical and biological conditions in the vicinity of the facility, including the intake and outfall. Through proper siting of facilities and intake/outfall structures, impacts can be minimized. The goal of this strategy is to develop and implement a set of desalination facility siting guidelines and recommendations to minimize impacts to Sanctuary resources.

Activity 2.1: Identify Preferred Conditions and Habitats
MBNMS staff will identify preferred conditions and habitats types that are the most resilient to the impacts of brine effluent, as well as sensitive species and habitats where brine effluent disposal should be avoided.

Status: Phase 1
Potential Partners: CCC, CCRWQCB, SWRCB, scientific consultation

Activity 2.2: Develop Intake/Outfall Siting Guidelines
MBNMS staff will develop and implement recommendations and guidelines for siting of intake and outfall structures, which include the following:

A. Require appropriate outfall siting and design to ensure adequate mixing and dilution of brine effluent. Considerations for siting include avoiding areas with limited water circulation, and ensuring discharge to an appropriate depth and distance offshore
B. Encourage use of appropriately sited existing pipelines of acceptable structural integrity rather than construction of new ones, which may cause seabed alteration. Considerations include:

    - Mixing of brine effluent with power plant cooling water or sewage treatment plant discharges where appropriate. When co-location is an option, ensure that temporal variations in operation, and maintenance of facilities are addressed to ensure sufficient dilution of brine effluent
    - If necessary, investigate the potential for upgrading existing pipelines if potential exists for use as desalination intake/outfall structure

C. In cases where new pipeline construction is required, ensure proper routing and construction techniques to minimize environmental and recreational impacts

    - Intake siting and design to minimize impingement and entrainment impacts
    - Consideration of the potential for the effluent to be entrained in the intake
    - Consideration of the quality of the water in the vicinity of the intake, to avoid the potential for concentration of contaminants in the feed water

Status: Phase 1
Potential Partners: CCC, CCRWQCB, SWRCB, scientific consultation

Activity 2.3: Ensure Comprehensive Consideration of Potential Impacts
MBNMS staff will develop and implement recommendations and guidelines to ensure that planned facilities consider:

A. Aesthetic, recreational, public access, and safety aspects
B. The effects of surface waves, circulation, density, and mixing, on the dispersal of brine effluent
C. Surface wave and sea level effects and geological considerations including earthquake hazards, liquefaction, sand transport patterns, and beach erosion rates for proposed structures to be located on or near beach
D. Review of alternatives analysis for water supply needs and supply options under CEQA
E. Emergency contingencies and incorporation of system-wide fail safe technologies to address the potential for emergency scenarios (mechanical failures, terrorist attacks, etc.)
F. Potential cumulative impacts from multiple facilities

Status: Phase 1
Potential Partners: CCC, CCRWQCB, SWRCB, scientific consultation, state geologists, various local jurisdictions with expertise

Strategy DESAL-3: Environmental Standards for Desalination Facilities

Strategy Description
Specific engineering and design aspects of desalination plants are a major determinant of the severity of the impacts. There is an increasingly wide range of different technologies available, including many promising new advances in intake design, pretreatment, reverse osmosis, and brine disposal technology. The goal of this strategy is to define and implement environmental standards for desalination facilities operating in the MBNMS. This strategy recognizes the need to minimize the adverse impacts to marine resources, through proper design and operation considerations. The Sanctuary shall define specific standards that proposed facilities would be required to meet through proper design and engineering. Compliance with standards shall be measured using requirements included in Strategy DESAL-4: Modeling and Monitoring Requirements.

Activity 3.1: Define Limits for Constituents of Brine Effluent
MBNMS staff will define and implement limits for salinity levels, and other constituents of brine effluent in collaboration with other regulatory agencies. Standards shall take into consideration potential cumulative impacts from multiple facility operations. Standards shall be met through:

A. Use of appropriate brine effluent disposal techniques to avoid or minimize impacts from elevated salinity
B. Mitigation of other potentially toxic, introduced and naturally occurring constituents of the brine prior to discharge including:
    - Use of pretreatment techniques that minimize or eliminate the need for potentially toxic chemicals
    - Use of materials that minimize the corrosion of hazardous substances

Status: Phase 1
Potential Partners: CCC, CCRWQCB, SWRCB

Activity 3.2: Define Entrainment and Impingement Standards
MBNMS staff will define and implement an environmental standard for entrainment and impingement impacts. Standards shall take into consideration potential cumulative impacts from multiple facility operations, and shall be met through:

A. Appropriate intake design to avoid or reduce entrainment and impingement e.g. mesh screens and diversion screens, onshore intake wells or infiltration galleries
B. For those intakes located in the water column, low flow velocities in the intake channels to minimize impingement of marine species

Status: Phase 1
Potential Partners: CCC, CCRWQCB, SWRCB, scientific consultation

Strategy DESAL-4: Modeling and Monitoring Program

Strategy Description
There is a need for a comprehensive modeling and monitoring program, to determine predicted properties of brine plume, and measure short and long term, and cumulative impacts. The program will include information requirements for parties seeking permits, as well as a multi-tiered modeling and monitoring program. This multi-tiered approach includes identifying different levels of requirements based on characteristics of a proposed facility such as its location, the biological sensitivity of the habitat near its intake and outfall, specific properties of the brine discharge plume, and other characteristics.

Activity 4.1: Establish Regional Modeling Guidelines
MBNMS staff will establish and implement regional guidelines for modeling of expected brine effluent plumes:

A. Evaluate accuracy of existing plume and circulation models applied to desalination, including field testing, if necessary
B. Acceptance of credible models that shall be a standard for defining criteria for the zone of initial dilution in the Sanctuary

Status: Phase 2
Potential Partners: CCC, CCRWQCB, SWRCB, scientific consultation

Activity 4.2: Identify Minimum Information Required for Project Application
MBNMS staff will identify the minimum requirements for the standard information submittal for any proposed facilities seeking permits. This will include:

A. Initial evaluation of recreational, public use, and commercial impacts in vicinity of desalination facility
B. Initial monitoring to determine currents, tides, water depth and similar parameters of receiving waters
C. Pre-construction biological analysis with consideration of seasonal variability, of marine organisms in the affected area and control site to include indices, species richness, and abundance, along with evaluation of entrainment and impingement impacts
D. Pre-construction estimation of expected brine composition, volumes, and dilution rates of the brine in the zone of initial dilution
E. Plan for toxicity testing of the whole effluent as an ongoing monitoring requirement
F. Studies to determine properties of combined discharges (cooling water or sewage), and their effects and toxicity on local species
G. Post-operational monitoring of salinity in zone of initial dilution and control site, as indicator for plume spreading and dispersal, to be compared with expected results from plume and circulation modeling. If not in compliance then identify and implement corrective actions
H. End of pipe monitoring program to verify results from expected brine composition and dilution

Status: Phase 2

Potential Partners: CCC, CCRWQCB, SWRCB, scientific consultation

Activity 4.3: Identify Additional Requirements for Application Submittal
Staff will identify additional requirements for those proposed facilities that may affect sensitive habitats or may have increased or significant impacts on coastal resources. Based upon sensitivity of habitat in vicinity of the discharge and size of zone of initial dilution, additional requirements may include:

A. Pre-construction monitoring of affected area as well as a control site, to include sampling of water column, and sediments
B. Post operational monitoring of affected area as well as a control site, to include sampling of water column and sediments, to be compared with pre-operational monitoring results
C. Post operational monitoring of oxygen levels, turbidity, heavy metals or other chemical concentrations, with regard to water quality standards
D. Post operational sampling of sediments for heavy metals to monitor possible accumulation (Possible bio-monitoring to sample tissues for heavy metals)
E. Post-operational biological analysis of marine organisms in the affected area and control site including indices, species richness, and abundance, to be compared with the pre-operational results
F. Monitoring of long term impacts of discharge (e.g. potential changes in species composition etc.)

Status: Phase 2
Potential Partners: CCC, CCRWQCB, SWRCB, scientific consultation

Activity 4.4: Determine Cumulative Impacts from Multiple Facilities
Staff will develop and implement a regional monitoring program to determine cumulative impacts from multiple facilities, to include:

A. A method to assess the potential cumulative impacts of saline brine effluent, on Sanctuary biological resources
B. Modeling of entrainment and impingement for impacts of the total volume of intake water removed from multiple sources

Status: Phase 2
Potential Partners: CCC, CCRWQCB, SWRCB, scientific consultation, C-Clean monitoring project

Strategy DESAL-5: Outreach and Information Exchange

Strategy Description
MBNMS staff shall conduct extensive outreach on the guidelines and recommendations developed by this working group.

Activity 5.1: Develop Outreach Plan for MBNMS Desalination Guidelines and Regulations
MBNMS staff will develop and implement a program for education and outreach to agencies, desalination plant proponents, and other interested parties about the guidelines as well as relevant regulations.

Status: Phase 2
Potential Partners: CCC, CCRWQCB, SWRCB, local jurisdictions, desalination proponents, Elkhorn Slough National Estuarine Research Reserve

Activity 5.2: Develop Outreach Plan for Information about Desalination Issues
MBNMS Staff will develop and implement strategies for ongoing outreach and education to general public and agencies about desalination issues and potential impacts on Sanctuary resources.

Status: Phase 3
Potential Partners: CCC, CCRWQCB, SWRCB, local jurisdictions,

Activity 5.3: Track Desalination Activity Outside of MBNMS
MBNMS will develop and maintain a system to track desalination activities including facility construction and operation outside of the Sanctuary, in an effort to remain current on trends in desalination activity.

Status: Phase 3
Potential Partners: CCC, CCRWQCB, SWRCB

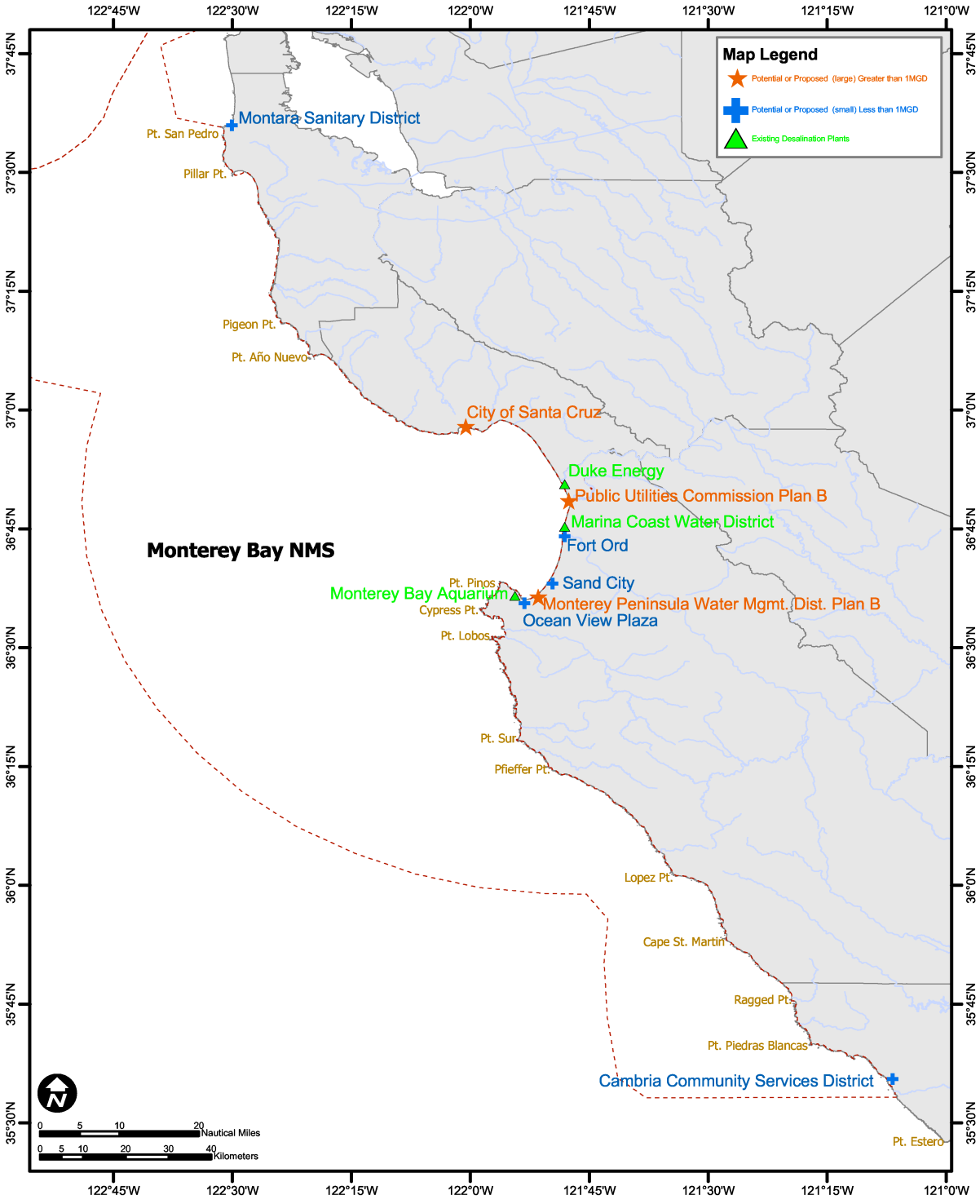
Activity 5.4: Track and Evaluate Emerging Desalination Technology
MBNMS staff will develop a program to track and evaluate new and emerging desalination technologies, and a system to incorporate these into existing and proposed plants.

Status: Phase 3
Potential Partners: CCC, CCRWQCB, SWRCB, desalination industry and proponents

Activity 5.5: Conduct Community Growth Impact Outreach
Conduct outreach to agencies and local jurisdictions to share information and concerns on potential impacts of community growth on Sanctuary resources.

Status: Phase 2
Potential Partners: CCC, CCRWQCB, SWRCB, local jurisdictions (cities and counties), land use and environmental organizations

Figure DESAL 1. Proposed / Potential Desalination Facilities



Harbors and Dredge Disposal Action Plan

Goal Statement
To develop a program with harbor managers and other stakeholders to address the need for disposal of dredged materials and the continued protection of MBNMS resources.

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Introduction
The periodic dredging of the local harbors is a necessary component of keeping the harbor channels clear and allowing access for all types of vessels. Although MBNMS regulations broadly prohibit disturbing the seabed, the specific act of dredging for harbors and their channels is specifically exempted by these regulations. Additionally, because dredging generally occurs with a port or harbor, which are outside the MBNMS boundaries it is afforded further exception from the regulations. However, the MBNMS does have a regulatory role when considering proposals to dispose of dredged disposal sediments offshore within the National Marine Sanctuary.

This working group has reviewed and discussed various issues related to dredge disposal that have arisen since designation of the MBNMS, including: disposal volumes, grain size, locations

of existing disposal sites, sedimentation sources, pier reconstruction at Moss Landing, sediment transport, beach nourishment, research gaps, and permit procedures. With input from agencies, harbormasters and other stakeholders, this review has focused on the continued protection of MBNMS resources, while also accommodating the disposal of harbor sediments when appropriate.

Harbors Adjacent to the MBNMS

There are four major harbors adjacent to the Monterey Bay National Marine Sanctuary (MBNMS). Two of these harbors regularly dredge the bottom of the harbor. Harbors dispose of their dredged material either in the ocean, on land at landfill sites, or at designated beach nourishment sites adjacent to the harbors. When the MBNMS was designated in 1992, two existing offshore sites for dredge disposal were identified, and the establishment of new sites was prohibited within its boundaries. However, since that time, the MBNMS has recognized and authorized the use of two additional disposal sites at Santa Cruz and Monterey Harbors, because MBNMS staff determined these sites were in use and permitted by other agencies prior to designation.

Current MBNMS Regulations

The MBNMS is mandated to approach resource protection from a broad, ecosystem-based perspective. This requires consideration of a complex array of habitats, species, and interconnected processes and their relationship to human activities. This is best stated by language directly from the National Marine Sanctuary Act which states one of the overarching goals of the Sanctuary program: "Maintain the natural biological communities in the national marine sanctuaries, and to protect, and where appropriate, restore and enhance natural habitats, populations and ecological processes." In accomplishing this goal the MBNMS intends to continue coordination with harbors to allow for disposal activities while protecting Sanctuary resources. We recognize that harbors are the gateways to accessing the MBNMS, and that physical processes, such as sediment movement, are important factors in controlling habitat structure, coastal erosion and littoral transport.

The MBNMS works with other state and federal agencies to ensure that MBNMS resources are protected. The MBNMS coordinates with the California Coastal Commission, the US Army Corps of Engineers, Environmental Protection Agency, the Regional Water Quality Control Board, California Department of Fish and Game, National Marine Fisheries Service, and the US Fish and Wildlife Service to review and authorize dredge disposal, as well as other discharges within the MBNMS. The MBNMS reviews the composition of the sediment, volumes, grain size, and associated contaminant load, to determine if the dredge sediments are appropriate for disposal in the ocean and comply with the provisions of relevant laws such as the Clean Water Act and the National Marine Sanctuaries Act. Most agencies have a specific mandate under which they view the potential disposal impacts, such as Essential Fish Habitat, or effects as they pertain to the Endangered Species Act. The MBNMS examines the issue from a larger holistic view of ecosystem protection.

The MBNMS regulations at 15CFR§922.132 describe prohibited or otherwise regulated activities. This section states that dredge disposal is prohibited within the MBNMS except for dredged material deposited at disposal sites authorized by the U.S. Environmental Protection

Agency (EPA) (in consultation with the U.S. Army Corps of Engineers (COE)) prior to the effective date of Sanctuary designation (January 1, 1993), provided that the activity is pursuant to, and complies with the terms and conditions of, a valid Federal permit or approval.

The MBNMS regulations exempted dredge disposal activities that complied with a federal permit or approval existing on January 1, 1993. However, current dredge disposal permits and the associated needs do not fall into this category as the permits for disposal have since expired. Therefore, additional disposal at previously approved or permitted sites must be approved by NOAA in accordance with the authorization process (§944.11).

A MBNMS "authorization" must be obtained from local harbors when disposing of dredge sediments in the MBNMS (pursuant to MBNMS regulations at 15 CFR §§ 922.132(a)(2)(i), 922.132(f) and 922.49). The MBNMS works collectively with other agencies and "authorizes" other agency permits, generally the COE or the CCC. This authorization comes in the form of either a "no objection" letter to the primary permitting agency (generally either the COE or the CCC), a letter to another agency which recommends special conditions be added to that agency's primary permit, or in the form of an "authorization" issued directly to the harbor, which includes special conditions to ensure that these sediments are not adversely affecting the marine ecosystem and MBNMS resources.

These reviews allow MBNMS staff to minimize impacts to Sanctuary resources while allowing the continued operation of our critical local harbors. MBNMS officials have allowed approximately 98% (by volume) of all dredge sediment proposed by local harbors for offshore disposal in the MBNMS since 1992.

The two harbors that regularly dredge, Santa Cruz Harbor and Moss Landing Harbor, dispose of the bulk of their dredge sediments within the MBNMS. In 1992, as stated in the MBNMS Final Environmental Impact Statement/ Management Plan, the dredging needs of Santa Cruz Harbor were on the order of removal of 100,000 to 130,000 cubic yards of sand per year. Moss Landing Harbor in 1992 was known to require dredging every two to three years with an associated volume of 50,000 cubic yards removed per cycle.

Currently the Santa Cruz Harbor has a MBNMS authorization to dispose of 360,000 cubic yards per year in the MBNMS. Moss Landing Harbor has a MBNMS authorization, which allows for the disposal of 100,000 cubic yards of dredge sediments per year. The need for increased permitted volumes of material within a two-year period is thought to be due to natural events such as El Niño. Heavy rains associated with this phenomena often cause increased erosion in watersheds, and result in heavy sediment loading at the endpoint of rivers, in this case, the two harbors. Heavy winter storm conditions and high surf, also resultant from El Niño conditions, are known to deposit increased volumes of sand at the mouth of entrance channels during those El Niño years.

Strategy HDD–1: Agency Coordination Improvements

Strategy Description
The MBNMS will continue its role in authorizing permits for dredge disposal, while considering and improving the interagency review process. This strategy recognizes the need to improve interagency coordination for the purpose of streamlining the authorization process.

Activity 1.1: Conduct Coordinated Permit Review
The interagency coordination and review process for dredge disposal is quite complicated. Increased efficiency and coordination is needed on the review of harbor permit applications, as well as a strengthening of the collaborative approach to solving issues between the harbors and agencies. Articulating issues or concerns to the group as a whole may improve understanding of the various issues and foster a more streamlined approach to the management of dredge disposal within a National Marine Sanctuary. The MBNMS will continue to coordinate with the Coastal Commission, the COE, and the EPA to review permits and authorizations. Workgroup recommendations include:

A. Work collaboratively with others to establish an interagency Central Coast Dredge Team that would meet at regular intervals to discuss the myriad of issues related to the dredge disposal processes. This team should also identify and develop a regional plan, which provides for input from stakeholders, and addresses disposal needs at various locations
B. Improve understanding of joint agency roles
C. Encourage harbors to undertake advanced planning and coordination which may minimize the need for emergency permits
D. Schedule permit planning meetings with agencies and harbors in advance of the application process to address needs and collectively evaluate both the regular and emergency permit process, to include agency concerns and conditions in the permit
E. Evaluate other joint-permit programs
F. Where appropriate, align agency permits so each permit or authorization is valid for the same time interval
G. Consider changes to dredge disposal practices, methods, and operations to benefit the resources, such as timing disposal events with winter storms, changing the methodology to increase oxygen levels or adding an additional pipe, where appropriate. Consider the natural sedimentation processes and, where beneficial, mimic them

Status: Phase 2
Potential Partners: regulatory agencies, harbors, others

Activity 1.2: Increase Permit Review Efficiency by Issuing Multi-year Authorizations
The MBNMS has issued multi-year authorizations in the past. The MBNMS issues authorizations under the process outlined in the background section of this document as stated under section §944.11. The authorization interval could potentially be increased to provide efficiency for both the harbor as well as the MBNMS. Workgroup recommendations include:

A. Coordinating the timing and conditions of the multi-year permit process
B. Agencies should continue to review specific disposal episodes

C. Multi-year authorizations should include language, which will re-evaluate the conditions of the authorizations and may include additional testing, or sampling and monitoring requirements if additional contaminants are thought to be present
D. In establishing appropriate time intervals, balance opportunities for efficiency with the need for periodic comprehensive review and public input

Status: Phase 2
Potential Partners: regulatory agencies, harbors, others

Strategy HDD-2: Offshore Disposal Sites

Strategy Description
This strategy recognizes the need to codify dredge disposal sites that have been recognized, after MBNMS designation, as being historical disposal sites.

Activity 2.1: Formalize Existing Santa Cruz and Monterey Sites
Since designation, Santa Cruz and Monterey Harbors have identified additional disposal sites, which were in historic use prior to MBNMS designation. These sites have since been authorized for use via letters from the Sanctuary program. Workgroup recommendations include:

A. Codification of two historical sites in the new management plan
B. Determine if the Santa Cruz Harbor disposal site warrants enlargement or shifting, for the purpose of complying with a request by the Monterey Bay Unified Air Pollution Control Agency to move the dredge disposal pipe to a deeper location to mitigate hydrogen sulfide fumes emanating from the dredged material
C. Evaluate potential environmental and legal issues related to potential expansion of Santa Cruz disposal area

Status: Phase 1
Potential Partners: MBNMS, CCC, COE, Santa Cruz Harbor District, Monterey Harbor District, City of Santa Cruz, City of Monterey, regulatory agencies

Activity 2.2: Evaluate Relocation or Redefinition of SF-12 Dredge Disposal Site
There has been some confusion about the exact location of SF-12. Recently the COE and the EPA have determined the correct current location of the disposal site. This current site was originally intended as a site to flow into the Monterey Canyon, however the location has some problems associated with it and is not meeting that goal. The Working Group recommends evaluating the Moss Landing disposal site (SF-12) in order to determine if shifting the location to the head of the Monterey Bay Canyon is warranted for the purpose of reducing environmental impacts to local beaches, and minimizing adverse impacts associated with fine silt and mud in dredge sediments to the nearshore region, the public, and the biological resources in the surf zone. More importantly, this would also aid in minimizing potential adverse impacts to the Moss Landing Marine Laboratories seawater intake system and their plans to rebuild the Moss Landing pier for science purposes. Workgroup recommendations include:

A. Clarify and disseminate information on exact existing boundaries of SF-12 to all interested parties
B. Evaluate whether the current location of the dredge disposal pipe is no longer the best option, considering environmental impacts, dredge disposal needs and pier reconstruction
C. Evaluate legal aspects of potentially shifting the location of SF-12, while preserving its intended function; evaluate whether this would be allowed by Sanctuary program.
D. Evaluate information on the environmental impacts of shifting the disposal location
E. The EIS for the JMPR will be able to evaluate comparative impacts from a relocated SF-12 compared to its original site at designation. If the impacts are not worse than the

originally approved impacts in 1992, the MBNMS could support the EPA's relocation of SF-12 in the future

Status: Phase 1
Potential Partners: regulatory agencies, harbors, environmental organizations, research institutions, others

Activity 2.3: Evaluate Potential New Dredge Disposal Site for Pillar Point Harbor
The Pillar Point Harbor has not been dredged since the 1980's when the inner harbor was created. Currently the Pillar Point Harbor does not have a designated subtidal dredge disposal site directly adjacent to the harbor, however there is a beach present inside the harbor, which may be able to receive dredged sediments. The harbor is currently contemplating a dredging effort, which would entail conducting maintenance dredging of the outer and inner harbor areas to eliminate sedimentation that has accumulated over the years. The estimated volume of this project would be approximately 72,000 cubic yards for the maintenance dredging component. This material is thought to be primarily sand. The harbor is also considering a possible expansion of berth capacity, which the Working Group requested be analyzed separately in the environmental analysis that will be required of this issue.

Workgroup recommendations include:

A. Analyze the need for new dredge disposal location at Pillar Point, submit volume request, location baseline environment
B. Evaluate options for allowing maintenance of this local harbor disposal while avoiding setting a precedent on new sites for Sanctuary program as a whole. Designation of a new disposal site would be a significant change to MBNMS regulations
C. Evaluate potential locations for a new dredge disposal site
D. Evaluate environmental impacts of the proposed disposal activity.
E. Analyze information on the impacts of designating a new disposal site, including a thorough review of habitat and species impacts, contamination analysis, proposed volume information, grain size issues, etc. The analysis should distinguish between impacts of the disposal of maintenance dredging material and disposal from proposed berth expansion

> **Staff Note:** The MBNMS could do a program level of environmental review of a dredge disposal site in the EIS for the JMPR. However a project level of environmental review that would allow for designation of a new site by all state and federal agencies would require a more detailed environmental analysis than is possible for the JMPR Program EIS. The MBNMS staff will work with San Mateo County Harbor District staff and other agencies on future environmental analysis.

F. Evaluate potential benefits of the disposal activity, such as erosion reduction at Surfer's Beach
G. Explore ways to better manage dredging needs – sand bypassing, breakwater design, sand traps, and other reengineering options for dredging; as identified in Strategy HDD-3

Status: Analysis-Phase 1, Decision-Phase 2
Potential Partners: Regulatory agencies, harbors, environmental organizations, others

Strategy HDD–3: Sediment Monitoring and Reduction Program

Strategy Description
This strategy recognizes the need to track and evaluate the call for increased disposal volumes, identify areas where improvements could be made to reduce increase sedimentation in harbors, evaluate contamination levels and sources, and conduct research to minimize information gaps.

Activity 3.1: Analyze the Need for Changes in Aquatic Disposal Volumes
Significant increases in the permit volume of dredge disposal sediments have been occurring within the MBNMS over the past 10 years. The Santa Cruz Harbor has increased their allowable permit volume by greater than 275% of the disposal quantity identified at the time of MBNMS designation. The Moss Landing Harbor has increased their allowable permit volume by 100% since MBNMS designation. In both instances, the MBNMS has authorized these increases. There are currently information gaps as to why this permitted increase is required. Workgroup recommendations include:

A. Develop an interagency database for tracking actual volumes and volume changes. This database should build off existing COE data and tracking system. This database should facilitate the submittal of electronic data and be web accessible for the public. Records of dredged volume should differentiate between and characterize the different types of sediment
B. Analyze trends in volume data and the causes of increased volume requests in permits. Link this information to potential effects
C. Encourage the use of technology to assess disposal volumes
D. Work with others to promote monitoring at designated disposal sites to establish and evaluate long term trends and related habitat and biological impacts from increased volumes
E. Track/Monitor sediment loading from watersheds, coastal transport, etc.
F. The MBNMS should recognize that there may be natural inter-annual variation in the amounts, which harbors need to discharge each year due to weather patterns, physical ocean conditions and watershed events. However, the MBNMS will analyze volume requests and potential impacts and may request information on causes and establish caps on allowed aquatic disposal volumes

Status: Phase 1
Potential Partners: regulatory agencies, harbors, research institutions, others

Activity 3.2: Design and Implement Sediment Reduction Program
Reduce the amount of dredge sediment entering the harbors, and hence reduce disposal needs into the MBNMS, by evaluating the watershed as a whole to determine where sediment reduction efforts could be implemented. Workgroup recommendations include:

A. Promote keeping sediment in the watershed and restoring habitat, which will reduce the need for dredging. The MBNMS should continue to encourage these efforts with the agricultural and rural community as part of the MBNMS Agriculture and Rural Lands Plan, which encourages farmers, ranchers, and rural landowners to use conservation

practices on their properties to reduce runoff in the form of sediments, nutrients and pesticides. The MBNMS should also work with others to prevent urban runoff and sedimentation into the watersheds

B. Explore tools to reduce entrapment of sediments by harbors, breakwaters, and other structures. Explore ways to better manage dredging – sand bypassing, sand traps, and other reengineering options for dredging; and as a result, reduce the need for increased disposal. These actions may also reduce the need for emergency permits

Status: Phase 1
Potential Partners: regulatory agencies, harbors, environmental organizations, others

Activity 3.3: Evaluate and manage contamination and its source

This activity recognizes the need to evaluate contamination levels in dredged sediments. Contamination is usually related to fine grain sediment, whereas material high in sand content, which is larger in grain size, is relatively free of contamination. The physical characteristics of the sediment play a role in the strength of chemical adsorption and the active surface area of the particles. The Moss Landing Harbor 2002 results have yielded some of the most heavily contaminated sediments in recent years. Historical contamination issues should be addressed to better understand the problem. Workgroup recommendations include:

A. Manage contamination—including pesticides, biological contaminants, PCB's, Butyl tins, DDT's and others. Identify the upland sources of contaminated sediment. Promote solutions to address preventative contamination issues by linking to ongoing MBNMS water quality efforts
B. Encourage funding for upland retention of contaminated sediments
C. Develop partnerships and a means to address boating related contaminants and within harbor sources
D. Increase communication between harbors and agencies to ensure information going to the public and elected officials is accurate
E. Evaluate and expand existing educational materials and conduct education and outreach to the public on the issue
F. Conduct an assessment of the target audiences including, political officials, agriculture groups, and others to determine the best ways to package and distribute educational materials on contamination

Status: Phase 1
Potential Partners: regulatory agencies, harbors, environmental organizations, others

Activity 3.4: Conduct Research and Monitoring

Conducting research to investigate the issue of dredge disposal could reduce information gaps. Analysis of dredging in the context of coastal erosion and sediment flow may improve the overall understanding of these processes. The final disposition of fine-grained materials and the subsequent impacts is often unknown. Workgroup recommendations include:

A. Characterize and map contaminant levels in harbors to identify possible contamination sources, including a broad range of biological pathogens and microbial contamination to determine if it is of concern
B. Characterize and map contaminant levels in surrounding watersheds, including DDT's, PCB's, Butyl tins, and bio-pathogens to understand harbor contamination sources
C. Encourage the continuation of monitoring programs that include harbors, such as Mussel Watch
D. Continue to investigate the fate and effect of disposed material, both fine-grained and other
E. Determine if the ultimate deposition is consistent with the intent of the disposal method
F. Encourage collaborations with research to pair ongoing survey work to include bathymetry mapping at harbor areas and disposal sites
G. If changes in dredging depth are proposed for Moss Landing Harbor, consider possible linkages to tidal scour in Elkhorn Slough

Status: Phase 3
Potential Partners: Harbors, research institutions

Strategy HDD-4: Disposal of Fine Grained Material

Strategy Description
The disposal of fine-grained material is authorized at SF-12 and SF-14, existing offshore disposal sites in MBNMS. Occasionally the MBNMS receives a request to consider disposal of fine-grained sediments adjacent to the Santa Cruz Harbor. This strategy will evaluate the issue of grain size.

Activity 4.1: Conduct Grain Size Analysis
When determining if material is suitable for intertidal and subtidal disposal on local beaches adjacent to the harbors, the EPA relies on guidance, which indicates that the dredged material should be composed of at least 80% sand. This is an EPA national guideline. Consideration of the appropriateness of variation from this guideline should be weighed carefully. Workgroup recommendations include:

A. The MBNMS should continue to work with EPA/COE to evaluate sediment suitability
B. The MBNMS should continue to work closely on any project that would vary from EPA national guidelines on a case-by-case basis. The MBNMS will look very closely at any variances from those guidelines to ensure adequate protection of MBNMS resources
C. The MBNMS should work with other agencies to determine criteria for disposing dredged material that is less than 80% sand

Status: Phase 2
Potential Partners: EPA, COE

Strategy HDD-5: Alternative Disposal Methods

Strategy Description
This strategy recognizes the need to evaluate land-based disposal methods. Approximately 98% of harbor sediments appropriate for unconfined aquatic disposal have been authorized by the MBNMS for disposal in the marine environment. Occasionally, there may be other uses for dredged sediments that meet standards for the given beneficial use.

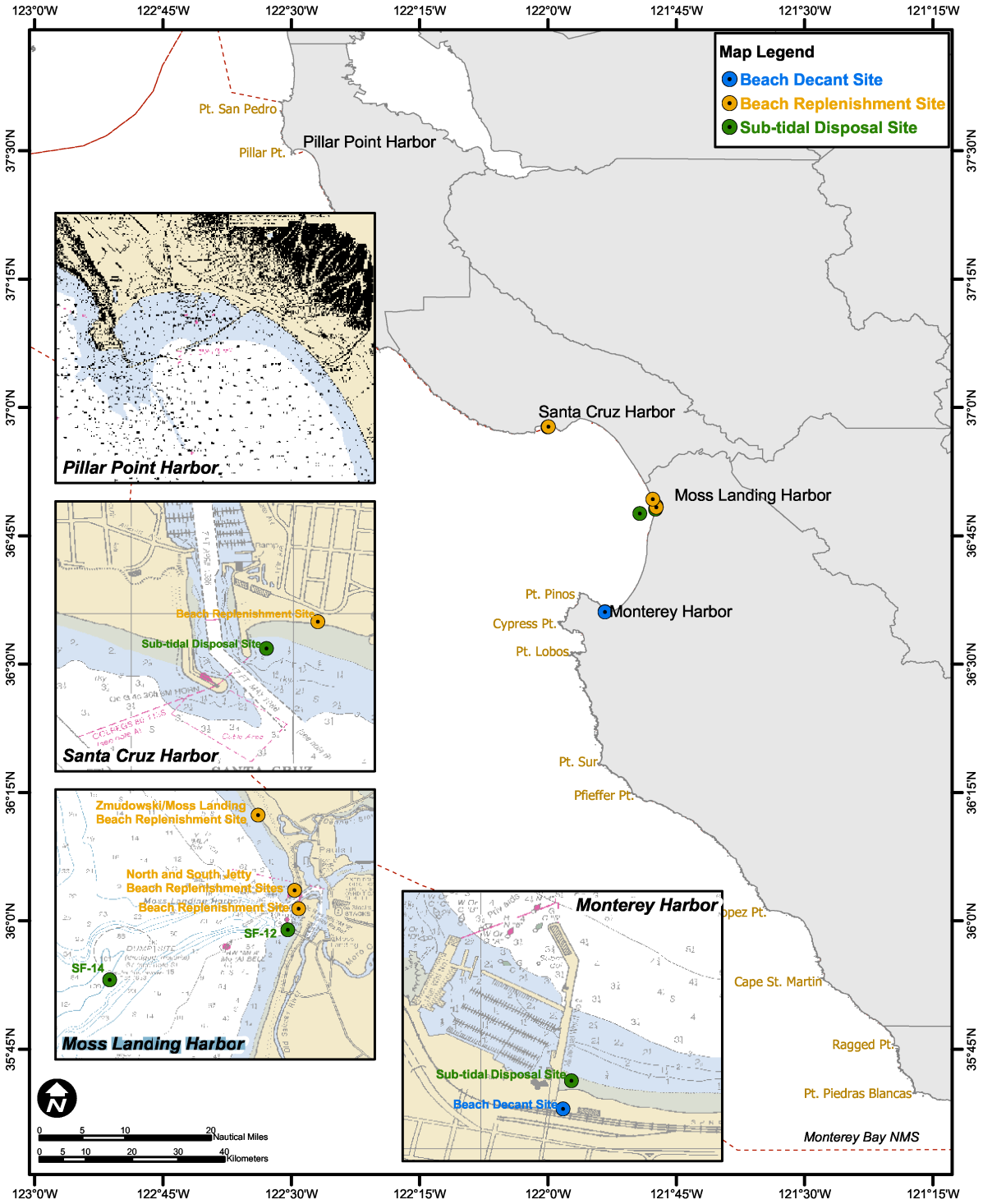
The Santa Cruz Harbor and the Moss Landing Harbor both have areas adjacent to the harbors that have been designated as beach nourishment sites. Both Harbors dispose dredged material below mean high water at those locations. Two additional areas at Moss Landing (Zmudowski Beach and the north jetty) are deemed beach nourishment sites. These sites are above mean high water and therefore outside of the MBNMS. These sites are not authorized by the MBNMS for subtidal disposal. Disposal at Zmudowski Beach and the north jetty has not taken place since MBNMS designation. Any future disposal there would need to be accomplished above mean high water. At this time there does not seem to be a need for additional beach nourishment sites within the MBNMS, except for possibly at Pillar Point Harbor.

Activity 5.1: Evaluate Potential Beneficial Usage of Dredged Materials
The potential beneficial uses for dredge disposal and distribution patterns shall be examined. Workgroup recommendations include:

A. Evaluate the beneficial uses of dredge disposal for suitable material
B. Define what is meant by "suitable" sediment for different kinds of disposal. This definition will aid public perception and may clarify confusion on the issue
C. Encourage coordination of alternative uses for different levels of contamination for non-marine disposal, such as daily cover for landfills, wetland restoration work, or agricultural uses
D. Encourage harbors to identify upland sites which would be available for a wide range of dredged material
E. Recognizing that littoral sand is a MBNMS resource, identify if, when and where beach nourishment is appropriate, and what data is needed to make that determination. Evaluate sand transport and science needs. Should future scientific results and harbor needs indicate that additional beach nourishment sites would be appropriate; MBNMS regulations would need to be revised in the future

Status: Phase 1
Potential Partners: regulatory agencies, harbors

Figure HDD 1. Harbors and Dredge Disposal Site



Submerged Cables Action Plan

This Action Plan was developed by an internal MBNMS staff team.

MBNMS Staff Contact
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Issue Description
Installation of submerged cables in MBNMS alters the seabed, causing environmental impacts and potential hazards for fishing activities. Submerged cables may be used for commercial, defense or research related activities. MBNMS regulations currently prohibit alteration of the seabed, yet allow, via permit or authorization, for some otherwise prohibited activities. Predominately, MBNMS regulations recognize certain activities that may benefit the Sanctuary, such as education, research, or management, thus a cable that provides these benefits could be permitted under existing regulations. Activities, otherwise prohibited, that are for commercial purposes, such as a telecommunications cable, are less preferred under existing MBNMS regulations.

MBNMS does not have clear policy guidance in reviewing applications for the installation of submerged cables. Currently submerged cable applications are reviewed on a case-by-case basis; however, up front policy guidance for future applicants would provide for a more efficient permitting process and inform future applicants as to preferred alternatives prior to submitting an application. In 1999, due to expanding interest in constructing submerged telecommunications cables in national marine sanctuaries, including MBNMS, the Department of Commerce initiated a process to consider guidance for cable projects proposed for national marine sanctuaries. Also, there has been a recent increase in interest to develop cabled observatories nationwide for research and monitoring purposes, including in MBNMS. In this Action Plan, the MBNMS will develop a framework to identify sensitive areas of the seafloor within the Sanctuary and provide clear structure with which to review future submerged cable development applications.

Background
Projects that include submerged cables for research, military and commercial uses are already in place within MBNMS. Known cables include:

- San Francisco-Honolulu 1903 telegraph cable, decommissioned
- Pioneer Seamount Cable (formerly Acoustic Thermometry of Ocean Climate (ATOC)), presently under the responsibility of the NOAA Oceanic and Atmospheric Research Division, used for passive research, http://oceanexplorer.noaa.gov/explorations/sound01/sound01.html
- Pt. Sur cable, U.S. Navy, used for research
- Monterey Inter-Shelf Observatory (MISO) cable, owned and operated by the Naval Postgraduate School for oceanographic research, www.oc.nps.navy.mil/~stanton/miso/

- Orpheus, National Marine Sanctuaries Program, video link to the Mystic Aquarium and Institute for Exploration, http://www.mysticaquarium.org/newthings/articles/immersion.asp
- Unknown coaxial cable, near ATOC cable

Submerged high voltage power cables are also already in use off of the Pacific coast and coastlines worldwide. Recently, there has been a rapidly increasing demand for telephone, Internet and data transmissions on the central California coast. Fiber optic cable, in particular, has a higher transmission capacity, higher reliability for uninterrupted service, greater security, and cost efficiency. Such cables are important to the continued growth of the economy, and they also bring societal benefits through improved education, opportunity, and connectivity. However, protecting the marine environment, particularly in sensitive areas such as national marine sanctuaries, is also important.

Federal, state, and local governments impose authorizations and permitting requirements for all forms of development. The types of issues that are evaluated for a proposed submerged cable project include, but are not limited to: cable route planning, cable installation (e.g., burial), operation, maintenance and repairs, and removal.

Cable installation in the marine environment typically consists of the following phases:

- Creating the conduit/shore crossing
- Pre-lay grapnel runs, in which the cable route is cleared of debris
- Cable burying through ploughing or jetting into soft sediment
- Cable laying on rocky or other substrate, as opposed to burial
- Post-lay route inspection using a remotely-operated vehicle (ROV)
- Re-lay or rebuild, depending on results of post-lay route inspection

Protecting the marine and coastal environment is imperative, nationwide, and in particular within National Marine Sanctuaries. Marine resources provide economic, cultural, and societal benefits to the nation. With the rapid growth and development in the coastal zone, these resources are at risk of degradation and loss. A sample of the type of environmental issues or topics that must be evaluated for any proposed submerged cable project include: sensitive marine habitats, water quality, marine mammals, submerged cultural resources, fishing activities, endangered species, cumulative effects, and esthetic values.

The MBNMS submerged cables plan will address the following areas of concern:

Compatible Use
Cables must be buried to a depth that does not preclude other uses of the seabed, including allowed fishing, anchoring, and research. Aside from installation and repair, if a cable remains buried at an appropriate depth, then in most cases it is probably compatible with these other uses.

Mitigation measures for impacts associated with submerged cable projects are often beneficial to both the protection of the environment, as well as the protection of the cable itself. Cable faults are often associated with bottom fishing activities and anchoring. Cable burial to an appropriate depth protects the cable from those activities and prevents the potential for marine mammal entanglements, fishing gear entanglements, and long-term disturbance of the seabed due to strumming. Therefore, developing project plans that include appropriate burial requirements to protect the Sanctuary resource, also serve to protect the cable as well, and the goals of both MBNMS and project applicant can be satisfied.

Seabed Disturbance
MBNMS regulations prohibit "drilling into, dredging, or otherwise altering the seabed of the Sanctuary: or constructing, placing or abandoning any structure, material or other matter on the seabed of the Sanctuary."[1]

Fishing Activities
The MBNMS recognizes the economic, commercial, and recreational importance of fishing activities in the Sanctuary. It is essential the project applicant protect these activities through the project proposal. To minimize potential conflicts and impacts on fishing from cable installation, operation, and repair, the project applicant may choose to enter into a Fishing Agreement with local commercial fishermen prior to permit approval. (Required by California Coastal Commission)

Wildlife Disturbance
MBNMS has one of the most diverse and abundant assemblages of marine animals in the world, including six species of pinniped, 27 species of cetacean, four species of sea turtles, 94 species of seabirds and one species of sea otter. Of the more than 116 federally listed threatened or endangered species (55 percent of all species nationwide) in California, 26 reside within MBNMS.

MBNMS is mandated to approach resource protection from a broad, ecosystem based perspective. This requires consideration of a complex array of habitats, species, and interconnected processes and their relationship to human activities. A summary of existing information about MBNMS natural resources can be found within MBNMS site characterization at:
http://montereybay.nos.noaa.gov/sitechar/welcome.html.

Frequent disturbance has the potential to adversely affect marine species. The effects of disturbance can be especially critical during sensitive time periods, such as feeding, breeding, resting, or nesting. Disturbance is likely to cause avoidance reactions and may result in interruptions of social behavior of animals and is capable of leading to long-term changes in distribution.

The scheduling of the initial laying of the cable and any monitoring and maintenance thereafter that includes dredging, trenching, cable-laying or similar disturbances, must address these sensitive time periods, as well as oceanographic and climate patterns in

order to reduce overall effects on ecosystems or certain species. In particular, whales have been known to become entangled with submerged cables during feeding activities if cables are insufficiently buried or exposed on the seafloor. There are documented cases also of sharks biting submerged cables, as they are attracted to the associated electromagnetic field. Marine mammals or sea turtles may collide with cable laying or monitoring vessels and be injured or killed.

Water Quality
MBNMS prohibits the marine discharge of sewage, oily bilge or ballast water, or debris from vessels installing, repairing, or otherwise associated with submerged cable projects. Vessel discharges can cause an adverse impact on water quality. Other ways in which submerged cable projects can degrade Sanctuary water quality include subsurface boring and installation of cable conduits that can result in the release of bentonite, a drilling lubricant, to the marine environment, as well as improper terrestrial construction practices that can cause adverse water quality impacts in the event of a storm or flood.

Maritime Heritage Resources
Maritime heritage resources are an important part of our nation's cultural heritage and their protection is a mandate of the National Marine Sanctuaries Act and by regulation in MBNMS. MBNMS has attempted to fully characterize these resources by assembling a database of known shipwrecks within the Sanctuary. MBNMS is developing strategies to define, identify, locate, characterize, and protect the maritime heritage resources within its boundaries, from shipwrecks to archaeological sites and artifacts.

Cumulative Impacts
Consideration of cumulative impacts should include an evaluation of the impact of a single project (including, installation, maintenance, repair, operation, and removal) in conjunction with existing or future cable projects, the total amount of disturbed or operational area required by cable construction and spacing between separate cables, and the cumulative disturbance of the seabed from proposed or existing cables along with other allowed activities.

Interagency Cooperation
When considering a proposal to lay and operate submerged cables in the marine and coastal environment, MBNMS must evaluate the project applicant's request relative to several statutes or authorities. These statutes provide the legal framework that governs decision-making. It is important to understand, however, that other federal, state, and local agencies have additional authorities that will also govern the construction and operation of submerged cables.

Federal Permit Requirements

National Marine Sanctuaries Act, NMSA
Relevant to submerged cables, MBNMS has regulations that would prohibit the installation of such cables. Such regulatory prohibitions include those against: drilling into, dredging or otherwise altering the seabed of the sanctuary; constructing, placing or

abandoning any structure, material or other matter on the seabed of the sanctuary; moving or injuring historical resources; and discharging or depositing any material or other matter in the sanctuary.

Prohibited activities may be conducted under certain limited circumstances to the extent they are compatible with the resource protection mandate and meet regulatory and other requirements for a sanctuary permit or other authorization. Sanctuary permits may be issued for research, education, management, or, in some instances, salvage activities. MBNMS has the authority to authorize another agency's permit for a specific activity, when such activity is compatible with resource protection and the purpose for which the sanctuary was designated. The NMSA also provides authority to issue special use permits for certain types of activities and NOAA may assess fees for the conduct of such activities.

The NMSA also statutorily prohibits destroying, causing the loss of, or injuring any sanctuary resource managed under law or regulations for that sanctuary.

Section 304(d) of the NMSA requires consultation on any Federal agency action internal or external to a national marine sanctuary, including private activities authorized by licenses, leases, or permits, that are likely to destroy, cause the loss of, or injure any sanctuary resources. Thus, for some proposed submerged cable projects that do not need a sanctuary permit or authorization but require another Federal agency's permit, consultation under the NMSA may be required.

Submerged Cable Projects for Research
MBNMS was designated for the purposes of protecting and managing the ecological, recreational, research, educational, historical and esthetic resources and qualities of the area. MBNMS regulations recognize certain activities that may benefit the Sanctuary, such as education, research, or management, thus a submerged cable that provides these benefits could be permitted under existing regulations. A proposed research cable project must demonstrate the benefit that it would provide to MBNMS, as well as that the project would have no long-term, adverse affects on MBNMS.

Permits are issued by the Sanctuary Superintendent for research and education related activities that are otherwise prohibited by Sanctuary regulations. The Superintendent can issue such permits if he/she determines that the activity will have only negligible short-term adverse effects on Sanctuary resources and qualities, will further research related to Sanctuary resources and qualities, will further the educational, natural, or historical resource value of the Sanctuary, or will assist in managing the Sanctuary.

In deciding whether to issue a permit, the Superintendent shall consider such factors as: the professional qualifications and financial ability of the applicant as related to the proposed activity, the duration of the activity and the duration of its effects; the appropriateness of the methods and procedures proposed by the applicant for the conduct of the activity; the extent to which the conduct of the activity may diminish or enhance Sanctuary resources and qualities; the cumulative effects of the activity; and the end

value of the activity. In addition, the Superintendent may consider such other factors, as he or she deems appropriate.

Commercial Submerged Cable Projects
MBNMS staff may allow construction and operation of a cable for commercial purposes, such as a trans-ocean fiber optic cable. Typically, because the Army Corps of Engineers issues a permit to allow construction and removal of a cable (but not operation of it), the MBNMS can "Authorize" the Corps permit for construction and removal, under the MBNMS Authorization process (more information on the authorization process can be found in the permitting section of these draft action plans). The MBNMS may also issue a special use permit to allow specific activities in a Sanctuary if such authorization is necessary to establish conditions of access to and use of any Sanctuary resource. A commercial submerged cable project's continued presence and use of the seabed during operation is considered a special use and is subject to the provisions of special use permits. Special use permits require a higher threshold for activities to be considered appropriate within the Sanctuary. Special use permits may be issued for the narrow range of activities that are both prohibited by NMSP regulations and will result in no adverse effect to the Sanctuary resource or qualities, and thus, must meet a higher standard than other categories of permits. Hence, the standard for issuing a special use permit is that the activity will cause no harm to MBNMS resources. The MBNMS does not consider intrusive activities related to commercial submarine cables such as installation, removal, and maintenance/repair work to qualify for a special use permit. Those activities would require an Authorization of another-agency's permit.

In addition, the NMSA provides four conditions on special use permits. The NMSA requires that special use permits shall:

- Authorize the conduct of an activity only if that activity is compatible with the purposes for which the Sanctuary is designated and with protection of Sanctuary resources
- Not authorize the conduct of any activity for a period of more than 5 years
- Require that activities carried out under the permit be conducted in a manner that does not destroy, cause the loss of, or injure Sanctuary resources
- Require the permittee to purchase and maintain comprehensive general liability insurance, or post an equivalent bond, against claims arising out of activities conducted under the permit and to agree to hold the United States harmless against such claims

National Environmental Protection Act (NEPA)
For the purpose of a proposed submerged cable to transit the coastal zone including a portion of a national marine sanctuary, several permits or approvals may be required (e.g., Army Corps of Engineers 404, NMSA permit or other authorization, and state permits and Federal consistency certification), each requiring federal or state environmental review. After providing sufficient background information on the proposed action to the involved agencies, the requisite level of review is determined, and a NEPA document is prepared and circulated for public review as appropriate. Upon

completion, final NEPA documents are cleared by the agency(s) and a determination is made on the applicable authorization(s) or permits(s). No final action by an applicant may occur prior to completion of the NEPA review process. In most cases, MBNMS will be the NEPA lead agency for submerged cables proposed in MBNMS.

Endangered Species Act (ESA)
Submerged cable projects will trigger this consultation process whenever a federal permit, license, or other action is needed for an activity that may affect a listed species. If a protected species or its critical habitat is present in the vicinity of the cable project, a Biological Assessment must be prepared by the permitting agency. Essentially the permitting agency must demonstrate that the proposed project will not jeopardize any protected species or adversely modify their critical habitat, and describe those efforts being made to prevent any adverse effects to protected species. If they believe there are no applicable alternatives to the project and that the project will not jeopardize the continued existence of a protected species, they may apply to the Endangered Species Committee for an ESA exemption.

Marine Mammal Protection Act (MMPA)
Laying cable on the seabed could potentially result in the incidental taking of marine mammals due to the elevated noise levels and vessel traffic associated with the laying of cable and entanglement of whales in the cable. NMFS regulations governing the small take authorization program are at 50 C.F.R. 216.101 et seq. The regulations provide for expedited one year authorizations for takes by harassment only and for five year authorizations covering all forms of takes.

Magnuson Stevens Fishery Conservation and Management Act (MSFCMA)
Submerged cable projects will trigger this Essential Fish Habitat (EFH) consultation process whenever a federal permit, license, or other action is needed, if the proposed activity may adversely affect EFH. Except in rare situations, the EFH consultation will be conducted between field offices of the action agency and NMFS. Regional NMFS offices have maps, tables, and reports documenting areas designated as EFH and can work with the authorizing agency and industry to determine whether a submerged cable project affects EFH. In combination with any documents associated with the traditional environmental review process (permit application, engineering plans, NEPA documents), an EFH Assessment must be prepared describing how the proposed project may affect EFH. The appropriate level of detail required in the consultation will depend on the proposed action and its potential impact on EFH.

The National Historic Preservation Act (NHPA)
The NHPA directs federal agencies to develop programs to protect their cultural and historic properties. Section 106 of the NHPA requires that all federal or federally funded undertakings, including federally permitted activities, be reviewed to ensure that no historic properties are negatively affected. The federal agency (in this case NOAA) must work in cooperation with states and the Advisory Council on Historic Preservation to minimize or prevent damage to the resources.

Submarine Cable Landing License Act
The President must grant permission to any entity planning to land a submarine cable in the United States. This statute requires an entity to get permission before it is allowed to land and operate a submarine cable from any point outside the continental United States onto the continental United States.

In a related Executive Order (E.O. 10530) the authority was delegated to the Federal Communications Commission (FCC) to grant, deny, or condition submarine cable landing licenses, except that no license can be granted or revoked without the FCC first obtaining approval from the Secretary of State and advice from any executive department of the Government as the Commission may deem necessary. National Telecommunications and Information Administration (NTIA), an agency within the Department of Commerce, advises the Department of State and the FCC on all submarine cable landing license applications. The factors NTIA considers in reviewing these applications involve competition issues and consumer matters.

California Statutes or Authority
Both the California State Lands Commission and California Coastal Commission have jurisdiction over cables and have been active in granting leases for submerged cables. Other state and local agencies may have review responsibility for a cable, depending on its specific location.

California State Lands Commission (CSLC)
The CSLC governs all ungranted State tidelands and submerged lands and is usually the State Lead Agency performing California Environmental Quality Act (CEQA) review of cable projects. CSLC is the owner and lessor of state lands, including submerged lands from the mean high tide line to three miles offshore. As the owner of these lands, the CSLC has the primary authority to charge fees for cable right-of-ways.

California Coastal Commission (CCC)
The CCC has the authority to issue coastal development permits for cable projects in the coastal zone and has federal consistency authority over projects that require a Federal action, pursuant to the CZMA. The CCC also conducts a Coastal Act consistency analysis and places conditions on projects to ensure their consistency with coastal policies. It typically takes an action after lead state agencies and federal agencies have taken their actions. In some limited cases within the MBNMS, portions of the state tidelands have been granted or others delegated to local agencies, such as the city of Monterey, and off the Moss Landing Harbor, out to specified, limited distances from shore. In these cases, the local agency has title or otherwise has authority to allow, or deny, a cable's construction.

California Environmental Quality Act (CEQA)
The basic goal of CEQA similar to the Federal Equivalent, NEPA, is to develop and maintain a high-quality environment now and in the future, while the specific goals of CEQA are for California's public agencies to identify the significant environmental

effects of their actions; and, either avoid those significant environmental effects, where feasible; or mitigate those significant environmental effects, where feasible.

Because the environmental impacts of submerged cable projects are potentially "significant," the State Lead Agency may prepare an Environmental Impact Report (EIR). The purpose of an EIR is to provide State and local agencies and the general public with detailed information on the potentially significant environmental effects which a proposed project is likely to have and to list ways which the significant environmental effects may be minimized and indicate alternatives to the project. Both the CSLC and the CCC require each cable proposal to undergo an environmental impact analysis that identifies potentially significant impacts, including effects on fishing, and appropriate mitigation measures, similar to the NEPA process. The CSLC and CCC have extensive conditions that are attached to the lease or permit for submerged cable projects.

Examples of some of the CCC standard conditions for submerged cable projects include:

- Where feasible, cable burial to a one meter depth out to the 1,000-fathom depth contour;
- Implementation of a horizontal directional drilling (HDD) monitoring and contingency plan;
- Extensive marine mammal monitoring during cable installation;
- Post-installation cable corridor surveying to document impacts to rocky substrate and identify areas where proper burial was not achieved;
- Payment of a rocky substrate (hard bottom) mitigation fee (for the purpose of constructing an artificial reef) if unavoidable impacts to hard substrate occur;
- Reburial in areas where burial is possible, but not achieved; and
- Regular monitoring every 18 to 24 months (to document changes in burial depth, exposures, suspensions, evidence of entanglements, etc.)

Strategy SC-1: Routing and Zones for Submerged Cable Projects

Strategy Description
MBNMS recommends keeping submerged cables out of special management areas such as national marine sanctuaries where initial placement and long term operation or maintenance would affect the designated management area and its resources. MBNMS will consider each cable application on a case-by-case basis, and consult with the affected state and federal agencies, and other interested persons to determine the route, which best meets the Sanctuary requirements. The proposed MBNMS submerged cable permit requirements exercises a precautionary, comprehensive approach to use of cables in the Sanctuary.

Activity 1.1: Identify Environmentally Sensitive Areas
MBNMS will develop, and update annually, GIS data layers of environmentally sensitive habitat areas on a broad, Sanctuary-wide scale, using the best available data. Initially this map will include the following fragile habitats and known archaeological sites wherein installations of submerged cables in and near the habitat area are known or very likely to cause unacceptable environmental harm:

- Marine trenches, valleys or canyons
- Rocky/cobble, hard bottom areas where cable cannot be buried or covered
- Sea grass communities
- Areas known or likely to have maritime heritage resources
- Kelp forests
- Critical habitat for endangered or threatened species
- Areas set aside as “no take” zones, “special marine protected areas,” or “marine or ecological reserves”
- Known spawning aggregation areas
- Estuarine habitats
- Essential Fish Habitat
- Highly erosive areas, such as canyons
- Cold seep communities

Because sensitive, rare, and slow-growing epifaunal species reside on rocky substrates, disturbance to these species from cable laying, installation and repair activities can permanently destroy them or cause long-term impacts. Cable-laying activities may also damage the rocky substrate. MBNMS permitting staff will use this map to identify the areas to avoid, as well as potential cable laying areas.

The map will also include:

- All known cables in the Sanctuary, active, inactive and stored
- Other known structures, such as pipelines, outfalls, and buoys
- Known research sites where cable construction would harm the research
- Trawling effort within the Sanctuary
- Characterization of the coast and landfalls

Staff Note: The appendices to this document are works in progress, to be updated by MBNMS annually. MBNMS will continue to work to improve the level of understanding and knowledge about the laying and operation of submarine cables. As new information and technology develops, the policies and permit requirements and conditions will evolve accordingly.

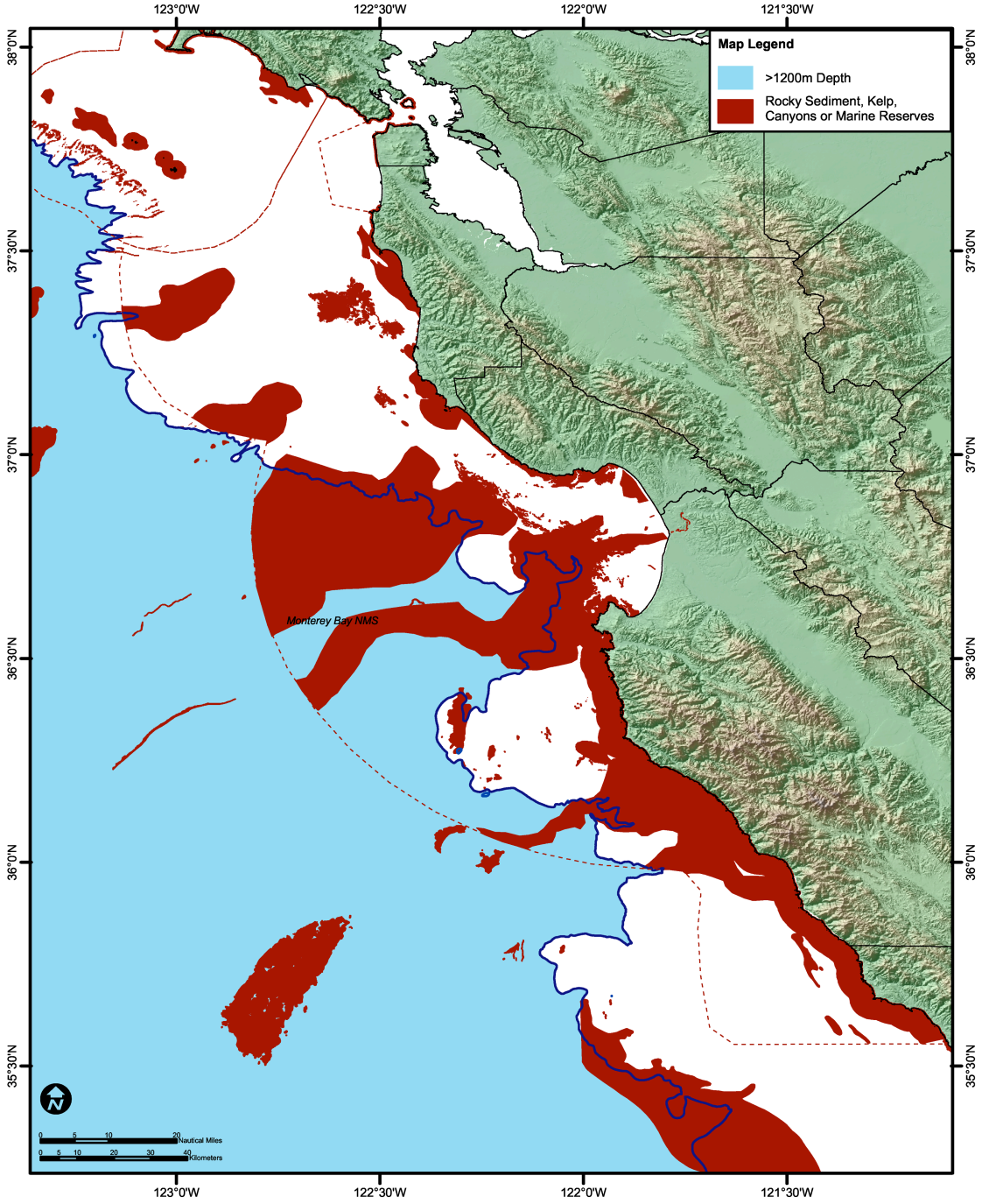
Activity 1.2: Develop Guidelines for Siting Constraints for Submerged Cables

Overall, submerged cables will not be permitted in the environmentally sensitive habitat areas. However, the MBNMS may allow submerged cables to be built into or through these areas where they will have clear and demonstrable resource management, research, and/or education value.

A. The MBNMS may set restrictions for the number of cables that will be allowed in certain areas, as "corridors" for future cables. This is designed to establish clearer guidance for future cable applicants and more predictability about future routing of cables.
B. MBNMS will produce these guidelines after completing Activity 1 and consulting with interested parties and stakeholders.

Potential Partners: California Coastal Commission, State Lands Commission, National Marine Fisheries Service, California Department of Fish and Game

Figure SC 1. Environmental Sensitive Habitats



Strategy SC-2: Submerged Cable Project Permit Guidelines

Strategy Description
MBNMS regulatory prohibitions require it to issue permits before any proposed submerged cable project can be built. The MBNMS may impose the terms and conditions of such authorization or right consistent with the purposes for which the Sanctuary is designated.

Activity 2.1: Develop Permit Pathway and Applicant Guidelines

A. Permit Process
The MBNMS has two strategies for potentially allowing commercial cables within the Sanctuary. The installation, maintenance, or removal of the cable will require an Authorization, whereas the continued presence of the cable will likely be permitted under a Special Use Permit. Permits will be required by MBNMS for the following activities related to submerged cables:

- Discharging or depositing, from within the boundary of the Sanctuary, any material or other matter
- Drilling into, dredging or otherwise altering the seabed of the Sanctuary; or constructing, placing or abandoning any structure, material or other matter on the seabed of the Sanctuary
- Taking any marine mammal, sea turtle or seabird in or above the Sanctuary

B. NEPA Review and Interagency Cooperation
MBNMS will coordinate with other Federal and State Agencies throughout the permitting process. MBNMS will act as a Federal Lead Agency in the NEPA process, and as such will work with the State Lead Agency, to produce a joint EIR. For every project considered, the environmental impact analysis must evaluate, at a minimum, the following topics:

- Potential cumulative impacts
- Feasible alternatives to transiting MBNMS, including alternative routes over land
- Potential impacts to habitat from laying the cable (e.g., trenching) and long term placement of the cable in its location
- Potential for impacts on sensitive, threatened and endangered species and their habitats
- Potential impact on submerged cultural resources, and traditional cultural uses
- Potential impacts of removing the cable at the end of its useful life
- Potential socioeconomic impacts (e.g., fishing interests, ecotourism etc.)

C. Project Description
It is critical that the project applicant initially provide a complete and thorough application in order to facilitate the permit process. Specifics and detail will enable MBNMS permitting staff to evaluate the proposed project more quickly.

D. Site Characterization and pre-construction surveys
Biological, cultural and habitat surveys along the proposed and alternative cable routes must be completed in advance by the project applicant in order to provide sufficient information to support actions that will avoid or minimize environmental impacts of the proposed project. The site characterization shall include the percent of the route where the cable can be buried and expect to remain buried over the cable lifetime, to an appropriate depth to minimize interferences and damage to the cable. This characterization shall also include a discussion of the penetration depths of bottom fishing activities in the proposed cable location, the expected anchor penetration depths from both recreational and commercial vessels using the area. The site characterization shall address specific areas of concerns such as wave energy intensity, bottom current strength, seasonal sand/sediment movement, coastal erosion rates of the shore landing relative to the scale of the cable project's life, landslide and other geological hazards. Project applicants will be required to collect baseline or pre-cable laying data in order to properly assess post-deployment impacts. The organisms that will be disturbed by installation, maintenance and monitoring of the cable, the ability or rate at which the ecosystem can be expected to fully recover, and the socio-economic impacts must also be considered.

Activity 2.2: Identify Development Standards
MBNMS staff will identify development standards for the following issues:

A. Cable Laying and Burial
Cables shall be buried to a depth pre-determined by the project applicant and approved by the Sanctuary Superintendent. Optimal burial depth is specific to site, other human uses, and bottom type. It accounts for the uses of seabed, including the cable, and is required to be at a depth sufficient to avoid conflicts with other ocean users and industries. Optimal burial depth also ensures that the natural sediment conditions will not unbury the cable with time. For example, most anchors and fishing gear will penetrate deeper in soft soil than in hard soil, the exact relationship depends on the individual hazard. Therefore, a cable buried to 1.5m in soft soil may not be as well protected as a cable buried only 0.5m deep in hard soil. The project applicant shall also use the best available proven technology to bury the cable.

B. Onshore Landing and Drilling
All proposed sites for shore crossings and cable landings must first consider using any pre-existing available onshore conduits. If there are no pre-existing conduits, or available conduits do not suit the project, then a new conduit may be proposed.

All proposed sites for shore crossings and cable landings must also first consider utilizing co-landings, or the installation of more than one cable in a single conduit through the nearshore environment. The use of co-landings would minimize the potential impacts associated with directional drilling operations.

In most cases, where no conduit exists for shore crossings, MBNMS will strongly prefer installation through horizontal directional drilling (HDD) from dry land out as far as needed, as determined by MBNMS to avoid sensitive nearshore marine habitat. The California Coastal Commission (CCC) currently prefers HDD[2] because HDD-related operations are staged from an onshore site, off the beach, usually at a parking lot or other vacant parcel. Relative to the usual alternative, installation of cables by trenching, the benefits of HDD technology include:

- Conduit installation occurs from an inland location and under the beach. Thus, no heavy equipment or other staging occurs on the beach, which allows the complete avoidance of many potential access and habitat impacts
- Cables are typically installed between 50-100 feet under the beach and surf zone thereby preventing future cable exposures that can occur as a result of beach sand migration, especially as a result of storm events or due to long-term changes in beach dynamics and erosion
- The staging area for HDD is typically much smaller than the affected area of a trenching operation, with commensurately reduced impacts to traffic and access

MBNMS also prefers directional drilling for these same reasons. However, spills, fluid loss and fractures can occur using directional drilling, resulting in sizeable releases into the marine environment, therefore, MBNMS may determine that trenching would be the preferred method in a given location.

C. Cable Removal

MBNMS regulations prohibit "drilling into, dredging, or otherwise altering the seabed of the Sanctuary, or constructing, placing or abandoning any structure, material or other matter on the seabed of the Sanctuary."3 Therefore, the project applicant must remove all of the cable within MBNMS at the termination of the cable project.

Upon the conclusion of the cable project, MBNMS may support the transfer of a cable to a new project applicant, provided that applicant is granted the necessary MBNMS permits. Permit review for a transfer would include a cable integrity analysis to evaluate the status and expected future viability of the cable and other information as required by MBNMS. New project applicants would have to agree to all existing terms of existing permits, including cable removal. Storage of cable offshore, within the Sanctuary boundary, would be considered an abandoned structure, and is prohibited.

D. Cable monitoring, both "post-construction" and for the life of the project

The project applicant must, throughout the life of the project, continue cable monitoring, implemented in an environmentally sound manner. MBNMS may also choose to monitor the cable, and if so, will notify the cable applicant and provide them with the results of the survey.

A strategy shall be employed by the project applicant to monitor the cable throughout its permitted life for cable integrity, burial depth and its effects on the benthos.

Activity 2.3: Identify Standard Permit Conditions
In addition to developing a list of general and special permit conditions, MBNMS will work with other agencies with jurisdiction to develop a comprehensive list of all permit requirements for submerged cable projects.

Activity 2.4: Consider Standard Fee Structure for Submerged Cable Continued Presence on Seafloor and Operation
MBNMS staff will consider a standard fee structure for installation and operation of submerged cables within the MBNMS.

Special Use Permit Fees
MBNMS may issue special use permits to permit the conduct of specific activities in a Sanctuary if such authorization is necessary to establish conditions of access to and use of any Sanctuary resource. Special use permits can be issued for commercial activities that require access to the Sanctuary to achieve a desired goal. A commercial submerged cable project is considered a special use and is subject to the provisions of special use permits.

Pursuant to NMSA regulations, a fee will be assessed for any approved commercial submerged cable project. This fee includes:

A. The costs incurred, or expected to be incurred by MBNMS, to review and issue the permit (including labor, printing costs, and contracts for the preparation of supporting documentation)

B. The costs incurred, or expected to be incurred by MBNMS, as a direct result of the conduct of the activity for which the permit is issued, including the costs of monitoring the conduct of the activity (includes amounts to fund monitoring projects designed to assess the success or failure of the permittee to comply with the terms and conditions of the permit. Costs may also include money to fund a compliance monitoring program and to recoup any costs incurred by the NMSP in enforcing permit terms and conditions.)

C. An amount that represents the fair market value4 of the use of the Sanctuary resource (calculated using economic valuation methods appropriate to the situation)

D. The application processing/cost recovery fee can range between $5,000 and $50,000, depending on the scale and scope of the project. The Sanctuary Superintendent will provide a cost estimate once a project is defined. However, if additional environmental studies are required by MBNMS, the applicant is responsible for study costs.

MBNMS requires the project applicant to post a bond to cover the costs of negative impacts resulting from the cables, to ensure permit condition compliance, and to provide for cable removal.

Research cable projects shall be exempt from special use fees, but be required to make all data collected relative to the project available to MBNMS and the general public.

Citations

1 Title 15, Article IV, Section 944.5, Prohibited Activities, Code of Federal Regulations.

2 *Status Report on Installation of Offshore Fiber Optic Cables*. CCC Memo dated January 7, 2002. Kooser, Dettmer, Chia.

3 MBNMS Regulations, Section 944.5: Prohibited Activities. Federal Register. Vol. 57, No. 182. 1992.

4 Final Report. Fair Market Value Analysis for a Fiber Optic Cable Permit in National Marine Sanctuaries. August 2002. National Oceanic and Atmospheric Administration, National Ocean Service, National Marine Sanctuaries Program.